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THE AMERICAN ARCHITECT AND BUILDING NEWS

VOLUME XXIV

JULY – DECEMBER

1888

TICKNOR & CO. PUBLISHERS.
211 TREMONT ST. BOSTON.

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The American Architect and Building News

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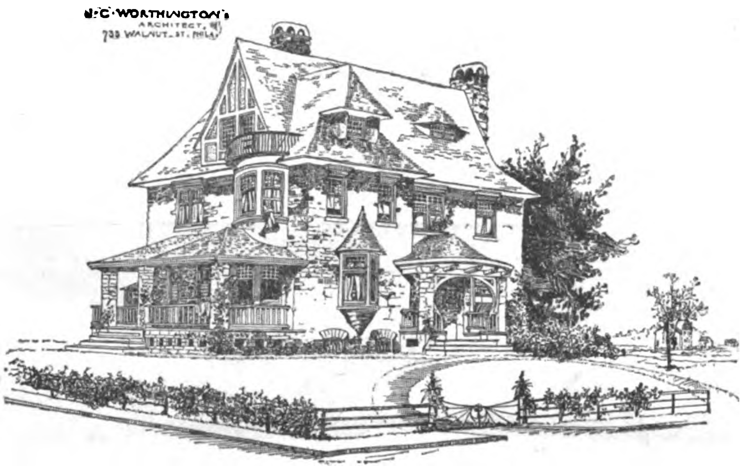

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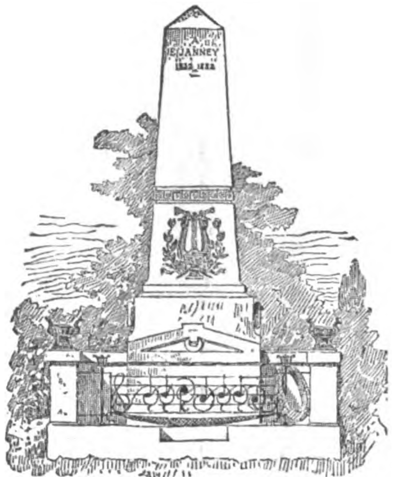

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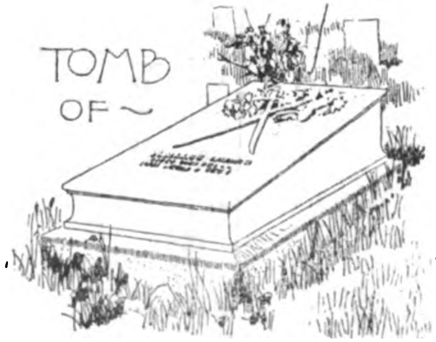

MAJ. THEODORE O'HARA.
FRANKFORT KY.

TOMBSTONES.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIV. No. 654.

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JULY 7, 1888.

Entered at the Post-Office at Boston as second-class matter.

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THE newspapers have already announced the death of M. Alfred-Augustin Durand-Claye, Chief Engineer of the corps of *Ponts-et-Chaussées*, Professor at the School of *Ponts-et-Chaussées* and at the School of Fine Arts, Officer of the Legion of Honor. Although so very distinguished in his profession, M. Durand-Claye was still almost a young man, having been born in 1842. He was educated at the semi-military college of Sainte-Barbe and at the Polytechnic School, from which he graduated with high honor in 1863. Three years later he was commissioned as engineer in the service of the city of Paris, and began those studies of drainage and sewage-disposal which have made his name famous. His earnest wish was to accomplish the drainage of Paris by sewers, after the model of London, abandoning the *fosses*, or vaults, which nearly every house in Paris still contains, and which, in the opinion of most sanitarians, constantly threaten the health of the city. Through his exertions, the change has begun, and it will not be long before a large part, at least, of the better Paris houses will be drained in the English manner, to the great comfort of their inhabitants. As increased drainage involves increased facilities for sewage-disposal, M. Durand-Claye devoted much time to the study of this part of the problem. Fortunately for the people who live in the lower Seine valley, the idea of allowing the sewage of Paris to run directly into the river is now regarded as inadmissible. The present sewers, which carry little except street-wash, discharge upon the irrigation-fields at Gennevilliers, and M. Durand-Claye, who was an ardent believer in sewage-irrigation, planned to extend the system to a larger territory at Saint-Germain. His scheme, although opposed by what the French papers called the almost overwhelming influence of the retail liquor-dealers, has, we believe, been adopted, at least in part, and the experience of Gennevilliers, the most interesting example of sewage-irrigation now in operation, is to be greatly increased in scale.

A CURIOUS trouble has come upon the occupants of the buildings in the lower part of Broadway, in New York, through the operations of the New York Steam Company. This Company, when its main pipes were first laid in the streets, used an expansion-joint packed with putty. Naturally, the putty has, in the course of years, lost its consistency, and it is now found necessary to replace the joints, one by one, with new ones, packed with copper. The change seems to be made in a very leisurely manner, and as the hot steam leaks out meanwhile, the ground in the vicinity is raised to an uncomfortably high temperature. In the present case, a joint having to be made in the Broadway main, the street was opened, and for a week the steam was allowed to pour out of the opening, frightening horses, and heating the basements of the adjoining buildings, before some newspaper reporter called the attention of the officials of the Company to the trouble, only to be coolly told that the repairs would take another week, and that if any person brought suit or injunction against the Company on account of the nuisance, the work would be suspended, and the steam allowed to escape indefinitely. In the good old days of Governor Hoffman, a reply like this would have been followed by the summary occupation of the Company's premises by a company of soldiers, with orders to keep steam shut off until the leak was repaired; but modern governors are not made of such stern stuff, and the unfortunate abuttors have to bear their fate as best they may. According to the reporters, the thermometers in the basements of the neighboring stores range from one hundred and thirty to one hundred and seventy-five Fahrenheit, and the goods stored in them are rapidly spoiling. Moreover, the water in the neighboring mains is so heated that it cannot be pumped in pumps depending on atmospheric pressure, for the reason that steam forms over it as soon as the pressure is lowered by the exhaust, and the water will not rise after the piston. This is rather a serious matter for buildings depending on pumping to get water to the upper stories, and at last accounts some of the property-owners had become desperate, and were about to try whether the courts could not help them.

OUR German brethren have just adopted a new schedule of charges, which supersedes those previously in use, and presents some peculiarities. Like most German documents of the sort, it is rather too long and complicated for the English or American taste, and it is still further complicated by being adapted to the use of engineers, who, in Germany, are always very intimately associated with architects. The most striking peculiarity about the new schedule is the separation of buildings into six classes, the first class comprising barns, stables, plain storehouses and the simplest kind of factories; and, in engineering work, simple embankments of streams, laying out simple systems of water-supply, and roads of ordinary character. The fees to be paid for full professional service in relation to these, including sketches and working-drawings, estimates, general supervision and passing accounts, vary from two per cent on the cost for works involving an outlay of one hundred and fifty thousand dollars or more, to five per cent for those where the expenditure is less than twelve hundred and fifty dollars. The second class comprises the better sort of farm-houses, town-houses of the plainer sort, simple school-houses, almshouses, baths, barracks, prisons, custom-houses, plain rail-road-stations, ordinary greenhouses, storehouses for heavy weights, manufactories of a more important kind, and so on; and, for engineering work, simple harbor improvements, canals, exclusive of locks or bridges, drainage and water-supply where no machinery is to be employed, plain, straight bridges up to thirty-three feet span, and railways in level territory. For full professional service in these undertakings the fees range, in inverse proportion to the cost, from three to six and one-half per cent.

THE third class includes all town and country houses requiring a certain amount of artistic skill in design, such as those with ornamental vestibules or staircases, those with stores in the first story, and country-houses with verandas, together with conservatories or decorative greenhouses, handsome stables, temporary exhibition or festival buildings, structures for parks or zoological-gardens, high-school and university buildings, libraries, concert-halls and ball-rooms, theatres, banks, large railway-stations and other public buildings; and, in engineering, foundations, important harbor works, locks and weirs, water-supply for power, drainage and water-supply in general where tunnelling or sinking of shafts is required, pumping-works, drainage of cities, works for the collection, purification and distribution of water or gas, or for the production and distribution of electricity for lighting, building-construction for structures subject to vibration or heavy loads, or requiring roofs of wide span, bridges from thirty-three to one hundred and ninety-five feet span, short and simple tunnels, railways in hilly, marshy or peaty land, rope railways, and difficult highway construction. The designing and supervision of these is to be paid for by fees ranging from four to eight per cent on the cost, the fee for everything costing less than twenty-five thousand dollars being reckoned at more than five per cent.

THIS last class is by far the largest and seems to be regarded as comprising the greater part of the architect's or engineer's commissions. The fourth class includes, for architects, rich city and country dwellings, palaces, churches and

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chapels, club-houses, ball-rooms, theatres, town-halls, and other public buildings of a costly character, and for engineers, compressed-air and refrigerating works, docks, slips, dry-docks, dams, bridges of more than one hundred and ninety-five feet span, high aqueducts, drawbridges and bridges of monumental character, long tunnels, mountain railways, and important iron construction for buildings. These demand fees varying from five to nine and one-half per cent, inversely according to cost. The fifth class is only for architects, and includes interior decorations, pavements and parquetry, furniture, fountains, and monuments of all kinds, which are charged for at percentages varying from six to eleven per cent on the cost. The sixth class is only for engineers, and includes the installation of machinery and mechanical works, the fee varying from four and one-half to fifteen per cent.

AN awful explosion occurred last summer at Friedenshutte, in Silesia, the cause of which is still under discussion. Friedenshutte is a town in the mining district, containing great smelting establishments. In the one where the accident occurred, twenty-two large boilers, each about forty feet long, were used to furnish power for driving the blowing-machines, stamp-mills and other apparatus. For the sake of economy, the heated gases from the blast-furnaces were conveyed to the boilers by large tubes, but in order to insure the combustion of the inflammable portion of these gases, the grates of the boilers were kept supplied with burning coal, through which they were forced by the blast. The boilers communicated by means of a large steam drum, and there was a certain amount of communication between the fire-boxes through the branches of the gas supply-pipe. Just after midnight, on the twenty-fifth of July, all the boilers blew up at once, being torn into small pieces, which were thrown to an enormous distance. Twenty-one out of the twenty-two boilers had been tested a year previously, and, although they were old, having been in service for fourteen years, they were proved capable of sustaining a far greater pressure than that indicated by the gauge just before the accident, and stranger still, four out of the twenty-two were not in service, and had no fire under them, yet these were blown up like the rest. The inquest failed to throw much light on the matter, and a commission of experts was appointed, which has just published a curious report, quoted in the *Revue Industrielle*. All the evidence showed that the steam-pressure was not excessive, and that the water-gauges had been looked after, so the commission decided that the catastrophe could not be attributed either to steam-pressure or low water. It appeared, however, that just before the explosion several of the boilers had been fed with coal, moistened, as such coal often is, by sprinkling with water. In the judgment of the experts, the overloading of several grates at once with cold, moist coal, had had the effect of cooling the furnace gas temporarily below the point of combustion, leaving it, however, at a temperature high enough to distil the coal. In consequence of this, an immense volume of unconsumed carbonic oxide from the blast-furnaces, mixed with hydro-carbons from the coal on the grates, was poured into the fire-boxes and flues of some of the boilers, spreading by diffusion into the others, and mixing everywhere with air enough to form a dangerously-explosive compound. As soon as it found its way to the boilers where the fire was still bright, detonation took place, with the intensity and destructiveness characteristic of gas-explosions.

A NEW idea has been developed in Germany, in the shape of the manufacture of mortar, to be sold at retail to small builders and private individuals. The business requires very little capital, and the mortar, which is mixed by machinery, and of excellent quality, finds a ready sale, something like two million barrels having been disposed of last year in Berlin alone. It is rapidly becoming usual for city builders, here as elsewhere, instead of maintaining large yards, at enormous rents, for the storage of materials, to keep only an office, contracting for their bricks, lime, cement, doors, lumber, glass and so on, to be delivered at the building where they are to be used. This involves the manufacture of mortar on the ground, under unfavorable circumstances, and at an unnecessary expense; and a provision by which, on dropping a card into a box, or speaking a word through a telephone, a suitable quantity of first-rate mortar for any purpose, ready for use, could be delivered at an hour's notice where required, seems likely to be very useful. We use mortar containing a portion of cement with a freedom unknown abroad, and of course this could not be kept long on hand; but there would be no difficulty in taking the quantity required from a stock of lime mortar, adding the desired dose of cement, and running the mixture through a mill, turning it out in excellent condition. For householders, plasterers, carpenters, steam-fitters, furnace-men, and others who have occasion to use small quantities of mortar or cement, it could easily be supplied in cans or water-tight boxes, and all architects know that mortar honestly made in this way, and kept in stock, would be far superior in quality to that now generally employed in building.

THE *Builder* gives some statistics of the rate of wages in New South Wales, quoted from a report of the Immigration Agent at Sydney, which are worth comparing with similar statistics for our own country. In many respects the condition of the Australian colonies resembles that of our Western and Southwestern States. In both the population is rapidly increasing, and needs houses to live in, and in both the state of society is simple, and the employments incidental to an old and complex civilization hardly exist. The only profession of this class which has reached a high state of development in New South Wales seems to be that of the law, and, according to the Immigration Agent's report, the supply of legal talent in the colony is very large, exceeding the demand, in fact, so that the Agent does not advise lawyers to come there unless they have already an acquaintance in the country. Surgeons and physicians are already plenty, but, as he says, good aurists and other specialists could find remunerative employment. As in nearly all new countries, there has been a great immigration of young business men, book-keepers, clerks, salesmen and so on. The best of these have long ago occupied all the available situations, and there is no mercantile work left for the rest to do. The only field for skilled industry which seems to show no sign of being fully occupied is that which comprises the building trades, and experienced masons, bricklayers, carpenters and joiners can always find employment. In all the building trades the working day consists of eight hours, and carpenters, plumbers, painters and gas-fitters get, on an average, two dollars and a half a day; bricklayers and plasterers about three dollars, and laborers from two to two and a half.

THE great Russian railway grows so fast that from month to month it seems to take in a new province. A few weeks ago it had penetrated a hundred miles or so from the Caspian Sea into the barbarous country of the Turkomans. Now it has crossed from end to end the country which, since the beginning of history, has been the possession of independent tribes of robbers, and, passing through their capital, Bokhara, has reached Samarcand, close to the great plateau known as the "roof of the world," and within about three hundred miles of the Chinese frontier. Under General Annenkoff, whose energy and ingenuity in overcoming obstacles have made him famous, the road has advanced with a rapidity which obscures the achievements even of the Canadian Pacific engineers, and the Russians, not content with a railway extending through fifty degrees of longitude from St. Petersburg, already talk of building through sixty degrees more, to Vladivostock, on the Pacific Ocean. As there would be a difference of seven hours in time between the ends of the line, it would be interesting to know, in this case, what would be taken as the meridian for setting the railroad clocks. So far, according to M. Barré, who writes occasional notes on the subject to *La Semaine des Constructeurs*, the line is exclusively military, but it will probably soon be opened to the public, and the tourist or the merchant will then be able to leave Paris or London on Monday morning, and by the following Monday night be in China or in India, after passing through a succession of the most curious countries in the world. With the railway and the Russian administration have come peace and prosperity to the Asiatic plains, which have been continuously ravaged by bands of robbers since the time of Xenophon. Merv, which was lately a walled citadel, containing about three thousand turbulent inhabitants, in the middle of a desert in which no one but a robber could live, is already an important town, surrounded by a vast area of gardens, fields and pastures, effectually and, we may hope, permanently defended by Russian rifles and tranquillized by Russian administration.

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SAFE BUILDING.—XXVII.[1]

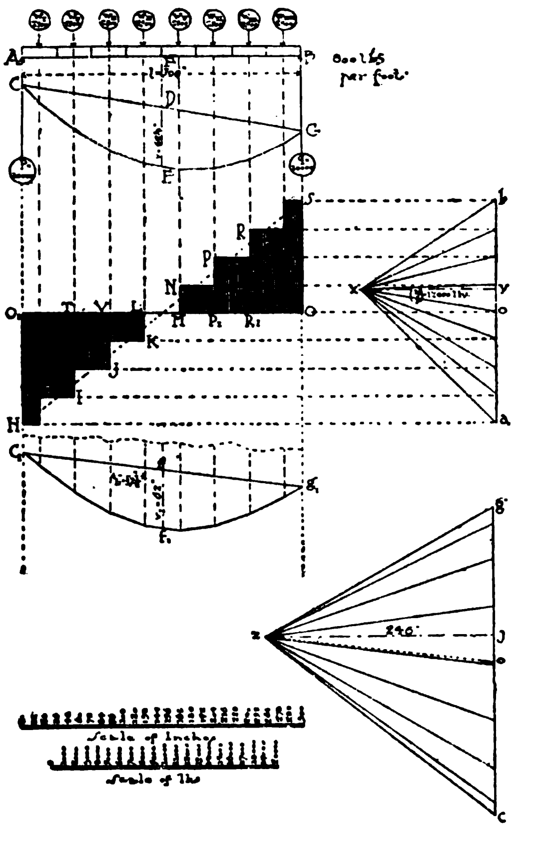

Fig. 156.

Example VI.

Uniform Load. *A wrought-iron beam of 25-foot span (Figure 156) carries a uniform load of 800 pounds per running foot of beam, including weight of beam. The beam is thoroughly braced sideways. What beam should be used?*

We draw $A\,B = 300''$ at inch scale, and then divide our uniform load into a number of equal sections, say eight, each

$$l_{,} = \frac{300}{8} = 37\tfrac{1}{2}'' \text{ long.}$$

The total load on beam is

$$u = 25.800 = 20000 \text{ pounds.}$$

Each section therefore carries:

$$\frac{u}{8} = \frac{20000}{8} = 2500 \text{ pounds.}$$

We place our arrows $w_{,}\ w_{,,}$ etc., at the centre of each section, which will bring the end ones at $\frac{l}{2}$ distant from each support, so that these same verticals will answer when obtaining deflection figure.

We now make $b\,a = 20000$ pounds at pound scale, and divide it into eight equal parts, each equal $w_{,} = w_{,,} = w_{,,,}$ etc., $= 2500$ pounds. We make $x\,y = 12000$ pounds, which is the $\left(\frac{k}{f}\right)$ for wrought-iron, see Table IV. We draw $x\,b$, $x\,a$, etc., and construct figure $C\,E\,G$, which will approach a parabola in outline. The more parts we take the nearer will it be to a parabola.

We draw $x\,o$ parallel $C\,G$ and find it bisects $b\,a$, or each reaction is one-half the load or $= 10000$ pounds. This we know is the case. The longest vertical will, of course, be at the centre D of $C\,G$, or greatest bending-moment will be at the centre, this we know is the case. $D\,E$ scales (inch scale) $62\frac{1}{2}''$ which will be the *required r* or moment of resistance (Formula 92). The bending-moment at the centre will be, Formula (93).

$$m = 62\tfrac{1}{2}.\ 12000 = 750000$$

Had we used Formula (21) we should have had

$$m = \frac{20000.\ 300}{8} = 750000$$ or same result, and from Formula (18) for

$$r = \frac{750000}{12000} = 62\tfrac{1}{2}$$ also the same as before. From Table XIX we find the nearest r to our required r (62,5) is 69,8 which calls for a $15'' - 150$ pounds beam; as the beam is braced sideways this will do, if sufficiently stiff.

In regard to shearing, we draw the figure $O_{,}\ H\ I\ J\ K\ L\ M\ N\ P\ R\ S\ O$ and find shearing on both sides of beam similar, increasing gradually from the centre to ends.[2]

It would be:

Cross shearing from A	to $w_{,}$	$= O_{,}\ H =$	10000 pounds.
Cross shearing from $w_{,}$	to $w_{,,}$	$= T\ I =$	7500 pounds.
Cross shearing from $w_{,,}$	to $w_{,,,}$	$= V\ J =$	5000 pounds.
Cross shearing from $w_{,,,}$	to $w_{,v}$	$= L\ K =$	2500 pounds.
Cross shearing from $w_{,v}$	to w_{v}	$= O =$	0 pounds.
Cross shearing from w_{v}	to $w_{v,}$	$= M\ N =$	2500 pounds.
Cross sheering from $w_{v,}$	to $w_{v,,}$	$= P\ P_{,} =$	5000 pounds.
Cross shearing from $w_{v,,}$	to $w_{v,,,}$	$= R\ R_{,} =$	7500 pounds.
Cross shearing from $w_{v,,,}$	to B	$= S\ O =$	10000 pounds.

The area of web of a $15'' - 150$ pounds beam (Table XIX) is 7,59 square inches; the safe resistance of wrought-iron to cross-shearing per square inch being $\left(\frac{g}{f}\right) = 8000$ pounds, we need not worry any further on that score.

To find the deflection we now make the lower load line $g\,c$ equal to the sum of the lengths of verticals $w_{v,,,}$, $w_{v,,}$, $w_{v,}$, etc., through parabola $C\,E\,G$, beginning at top g with length of right vertical $w_{v,,,}$. We select z at random, scale $z\,j = 246''$ (inch scale), draw $z\,g$, $z\,c$, etc., and figure $c_{,}\,f_{,}\,g_{,}$. We now draw $z\,o$ parallel $c_{,}\,g_{,}$ and find it bisects $g\,c$, or greatest deflection will be at centre of beam, which we know is the case. We scale $f\,f_{,} = 62''$ (inch scale); find from Table XIX for our $15'' - 150$ pounds beam $i = 523,5$ and from Table IV for wrought-iron $e = 27000000$, therefore, Formula (95):

$$\delta = \frac{62.37,5.\ 246.\ 12000}{27000000.523,5} = 0{,}486''$$

Had we figured arithmetically, Formula (39), we should have had

$$\delta = \frac{5.\ 20000.\ 300^3}{384.27000000.\ 523,5} = 0{,}497''$$

or practically the same result.

The safe deflection for plastering should not exceed (28)

$$\delta = 25.\ 0,03 = 0{,}75''$$

so that we are perfectly safe, providing our beam is well braced sideways.

Example VII.

Uniform and Concentrated Load. *A wrought-iron beam, braced sideways, of 30-foot span, Figure 157, carries a uniform load of 200 pounds per foot, including weight of beam. It carries also a concentrated load $w_{,} = 10000$ pounds ten feet from the right-hand support. What beam should be used?*

We draw beam $A\,B = 360''$ at inch scale, we divide uniform load into, say, six equal parts, each 5 feet long, or $l_{,} = 60''$. The total uniform load will be $u = 30.200 = 6000$ pounds, therefore each part $\frac{u}{6} = \frac{6000}{6} = 1000$ pounds. We draw arrows at the centre of each uniform part, so that the end arrows will be one-half part from supports. These arrows will therefore answer for our verticals, when drawing deflection figure.

At 120″ from right hand support we locate the load $w_{,} = 10000$ pounds.

We now make load line $b\,a = 16000$ pounds the total load and divide it, so that

$$b\,l = w_{v,,} = 1000 \text{ pounds.}$$
$$l\,h = w_{v,} = 1000 \text{ pounds.}$$

[2] Had we taken more parts, the steps in shearing figure would become smaller and smaller till they would finally assume the straight line $H\,S$, which is the real outline of shearing figure.

GLOSSARY OF SYMBOLS.—The following letters, *in all cases*, will be found to express the same meaning, *unless distinctly otherwise stated*, viz.:—

a = *area*, in square inches.
b = *breadth*, in inches.
c = constant for *ultimate resistance to compression*, in pounds, per square inch.
d = *depth*, in inches.
e = constant for *modulus of elasticity*, in pounds-inch, that is, pounds per square inch.
f = *factor-of-safety*.
g = constant for *ultimate resistance to shearing*, per square inch, across the grain.
$g_{,}$ = constant for *ultimate resistance to shearing*, per square inch, lengthwise of the grain.
h = *height*, in inches.
i = *moment of inertia*, in inches. [See Table I.]
k = *ultimate modulus of rupture*, in pounds, per square inch.
l = *length*, in inches.
m = *moment or bending moment*, in pounds-inch.
n = *constant* in Rankine's formula for compression of long pillars. [See Table I.]
o = the *centre*.
p = the *amount* of the *left-hand re-action* (or support) of beams, in pounds.
q = the *amount* of the *right-hand re-action* (or support) of beams, in pounds.
r = *moment of resistance*, in inches. [See Table I.]
s = *strain*, in pounds.
t = constant for *ultimate resistance to tension*, in pounds, per square inch.
u = *uniform load*, in pounds.
v = *stress*, in pounds.
w = *load at centre*, in pounds.
x, y and z signify *unknown quantities*, either in pounds or inches.
δ = *total deflection*, in inches.
ρ^2 = *square of the radius of gyration*, in inches. [See Table I.]
D = *diameter*, in inches.
R = *radius*, in inches
π = 3.14159, or, say, 3 1-7 signifies the *ratio of the circumference and diameter of a circle*.

If there are more than one of each kind, the second, third, etc., are indicated with the Roman numerals, as, for instance, a, $a_{,}$, $a_{,,}$, $a_{,,,}$, etc., or b, $b_{,}$, $b_{,,}$, $b_{,,,}$, etc.

In taking moments, or bending moments, strains, stresses, etc., to signify at what point they are taken, the letter signifying that point is added, as, for instance:—

m = moment or bending moment at *centre*.
m_A = " " " *point A.*
m_B = " " " *point B.*
m_X = " " " *point X.*
s = strain at *centre*.
s_B = " *point B.*
s_X = " *point X.*
v = stress at *centre*.
v_D = " *point D.*
v_X = " *point X.*
w = load at *centre*.
w_A = " *point A.*

[1] Continued from No. 649, page 259.

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$hf = w_{\prime} = 10000$ pounds.
$fe = w_{v} = 1000$ pounds.
$ed = w_{iv} = 1000$ pounds.
$dc = w_{iii} = 1000$ pounds.
$ca = w_{ii} = 1000$ pounds.

Select pole x distant from load line at random (for the sake of illustration, though it would be better to make $xy = \left(\frac{k}{f}\right) = 12000$ pounds.) We find xy scales 6500 pounds. We now draw xb, xl, xh, xf,

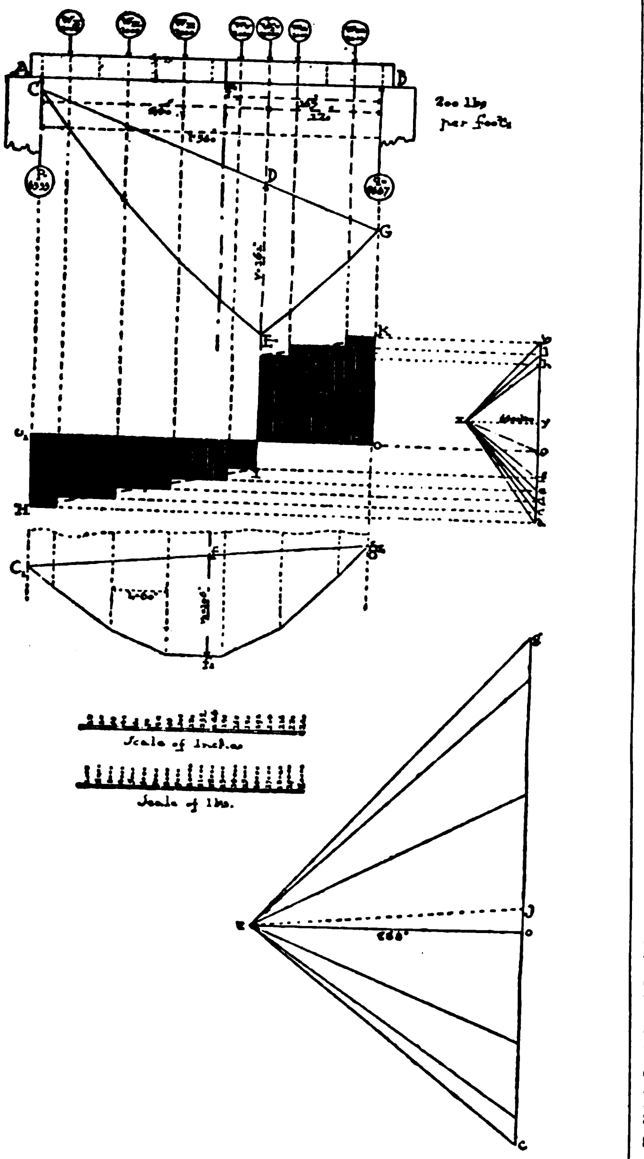

Fig. 157.

etc. And construct figure CEG. Draw xo parallel CG and we find ao (or reaction A) scales $= 6333$ pounds, and ob (or reaction B) scales $= 9667$ pounds.

The longest vertical is $DE = 161''$ (inch scale) therefore greatest bending-moment is at $w_{\prime}$ and from Formula (93)

$$m_{w_{\prime}} = 161.6500 = 1046500$$

For the *required* moment of resistance we have from Formula (18)

$$r = \frac{1046500}{12000} = 87{,}2$$

The *cheapest* or most economical nearest section we find — to this required r (87,2) is the 20″ — 200 pounds beam of which the moment of resistance is $r = 123{,}8$.

Had we combined the formulæ for uniform and concentrated loads and worked out the problem arithmetically it would have been tedious, but we should have had similar results.

We can safely overlook shearing, but note that the real shearing figure would not be the shaded figure, but dotted figure $O_{\prime}HIJKO$.

For finding the deflection we now draw lower load line $gc =$ the sum of the verticals through CEG, beginning at top with length of w_{vii}, then w_{vi}, w_{v}, w_{iv}, w_{iii}, and w_{ii} in their order. We take no notice of vertical $w_{\prime}$ as it does not fall in one of the even divisions of CG or AB into lengths $l_{\prime}$. We select pole z distant $zj = 288''$ from load line, draw zg, zc, etc., and then figure $c_{\prime}f_{\prime}g_{\prime}$. We now draw zo parallel $c_{\prime}g_{\prime}$ it divides gc, so that $go = 295''$ and $oc = 245''$, we divide $c_{\prime}g_{\prime}$ in same proportion at f, and carry this up to F at beam, which is the point of greatest deflection of beam, and is distant 163″ from B, and 197″ from A. We scale $ff_{\prime} = 106''$ (inch scale) and have from Formula (97)

$$\delta = \frac{106.\,60.\,288.\,6500}{27000000.\,1238} = 0{,}357''$$

1238 being $= i$, the moment of inertia of beam as found in Table XIX. The beam is therefore amply stiff even to carry plastering.

Irregular Cross-sections. The graphical method lends itself very readily to finding centres of gravity and neutral axes, as explained in the chapter on arches, and also for finding the moments of inertia of difficult cross-sections.

If we have an irregular figure $ABCDE$ (Figure 158) we divide it into simple parts I, II, III and IV. We find the centres of gravity $g_{\prime}$, g_{ii}, g_{iii} and g_{iv} of each part and

To find Neutral Axis. draw their respective horizontal neutral axes through these. Anywhere's make a line $ae =$ area of whole figure and divide it, so that:

$ab =$ area of I
$bc =$ area of II
$cd =$ area of III and
$de =$ area of IV.

Select pole x at random, draw xa, xb, xc, xd, and xe.

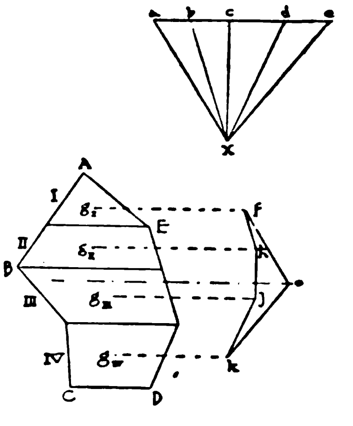

Fig. 158.

From any point of horizontal $g_{\prime}$ draw fh parallel bx till it insects horizontal g_{ii}; then draw hj parallel cx to horizontal g_{iii}; then jk parallel dx to last horizontal, and finally ko parallel xe; and fo parallel ax till they intersect at o. A horizontal through o is the main neutral axis of the whole.[1] If we multiply the

To find Moment of Inertia. area of the figure $fokjh$ by the area of the figure $ABCDE$ (both in square inches) we have the value of moment of inertia i of $ABCDE$ in inches, around its horizontal neutral axis o.

To find area. A simple way of obtaining the area of the figure fok would be to draw horizontal lines through it at *equal* distances, beginning with half distances at *top* and bottom, and to multiply the sum of these horizontals in length by the distance apart of any two horizontals, all measurements in inches. This will approximate quite closely both the area and moment of inertia. Of course the more parts we take in all of the processes, the closer will be our result.

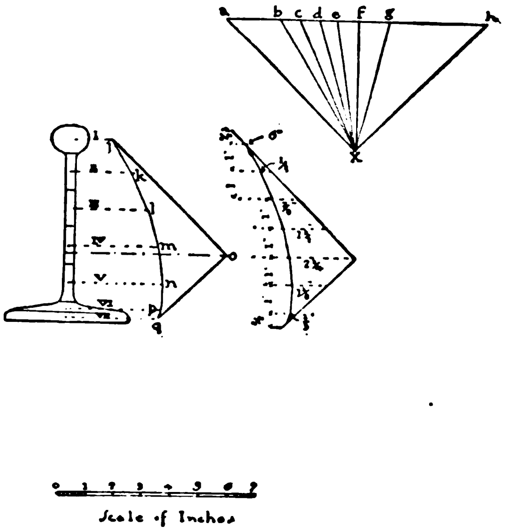

Fig. 159.

A practical example will more fully illustrate the above.

Example VIII.

Rolled Deck-beam. *Find horizontal neutral axis and the corresponding moment of inertia of a 7″ — 55 pounds per yard deck beam, resting on its flat flange (Figure 159).*

We will take the roll as one part, divide the web into four equal parts, the flange into two parts, one the base which will be practically rectangular, and its upper part which will be practically triangular. The whole area we know is for wrought-iron:

$$a = \frac{55}{10} = 5{,}5 \text{ square inches.}$$

The bottom rectangular part of flange will be

$$a_{vii} = 4\tfrac{1}{2}.\tfrac{3}{8} = 1{,}7 \text{ square inches}$$

next triangular part

$$a_{vi} = \frac{4\tfrac{1}{2}.\tfrac{3}{8}}{2} = 0{,}9$$

The web parts

$$a_{ii} = a_{iii} = a_{iv} = a_{v} = \frac{\frac{5}{16}.5\tfrac{1}{4}}{4} = 0{,}4 \text{ square inches each.}$$

Leaving for the roll at top $a_{\prime} = 1{,}3$

We now make the horizontal line $ah = 5{,}5''$ and divide it, so that

$ab = 1{,}3$ inches
$bc = cd = de = ef = 0{,}4$ inches

[1] The point of intersection of this line with a main neutral axis, found similarly, in any other direction, would be the centre of gravity of the whole figure.

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$fg = 0{,}9$ inches and
$gh = 1{,}7$ inches.

Select x at random and draw xa, xb, xc, etc.

Draw the horizontal neutral axes I, II, III, etc., through their respective parts. Begin anywhere on I and draw jk parallel bx to line II; then kl parallel cx to III; then lm parallel dx to IV; then mn parallel ex to V; then np parallel fx to VI; then pg parallel gx to VII; Now draw from q the line qo parallel xh, and from j the line jo parallel ax till they intersect at o. A horizontal through o is the neutral axis of whole beam.

Horizontal Neutral Axis.

We will now make a new drawing of figure joq for the sake of clearness. Draw horizontals through it every inch in height beginning at both top and bottom with one-half inch. The top one scales nothing, the next $\frac{1}{3}''$, then $\frac{7}{8}''$, then $1\frac{1}{2}''$, then $2\frac{1}{4}''$, then $1\frac{1}{8}''$, and the bottom one $\frac{1}{3}''$, the sum of all being $6\frac{5}{12}''$ or 6,416″. This multiplied by the height of the parts, which is one inch, would give us, of course, 6,416 square inches area. Multiplying this area by the area of the cross-section of deck beam 5,5 square inches, we should have

Area of Diagram.

$$i = 5{,}5 .\ 6{,}416 = 35{,}288.$$

Moment of Inertia of Beam. In Table XIX it is given as 35, 1 so that we are not very far out.

If we had taken more parts, of course the result would have been more exact.

Reducing Flanges, Plate Girders. When constructing plate girders of large size, much material can be saved by making the flanges heaviest at the point of greatest bending-moment, and gradually reducing the flanges towards the supports.

This is accomplished by making each flange at the point of greatest bending-moment of several thicknesses or layers of iron, the outer layer being the shortest, the next a little longer, etc. Of course the angles, which form part of the flange are kept of uniform size the whole length, as it would be awkward to attempt to use different sized angles. Generally (though not necessarily) the inner or first layer of the flange plates, is also run the entire length. Of course, where the flanges are gradually reduced in this way, it becomes necessary to figure the bending-moment and moment of resistance at many points along the plate girder to find where the plates can be reduced. This would be a wearisome job. By using the graphical method, however, it can be easily accomplished. Referring back to Figure 151, we take the point of greatest bending-moment (at w_1) of the beam $A\ B$. The required moment of resistance at this point, it will be remembered was the length (inch scale) of vertical E through $C\ D\ E\ F\ G$. We now decide what size angles we propose using and settle the necessary thickness of the flanges by Formula (36), inserting for the value of r, the length (inch scale) of v or vertical at E. Further a_1 will, of course, be the sum of the area of two angles, d the total depth of girder in inches and b the breadth of flange, in inches, less rivet holes. The above is on the assumption that the distance xy of pole x from load line da was equal to the safe modulus of rupture $\left(\frac{k}{f}\right)$ of steel or wrought-iron according to whichever material we were using, or we should have:

Thickness of Flanges.

$$x = \frac{\frac{v}{d} - a_1}{b} \qquad (98)$$

Where $x =$ the thickness, in inches, of each flange of a plate girder at any point of its length.

Where $v =$ the length of vertical, inch scale, through upper or resistance figure, providing we have assumed the distance of pole from load line (pound scale) $= \left(\frac{k}{f}\right)$ of the material.

Where $d =$ the total depth, in inohes, of the plate girder.

Where $b =$ the width, less rivet holes, in inches, of the flange.

Where $a_1 =$ the sum of the areas of cross-section, in square inches, of *two* of the angles used.

We now calculate as above, the thickness x of flange at point of greatest bending-moment and then decide into how many layers or thicknesses we will divide the flanges. Say, in our case we decide to make the flange of four layers of plates, each $\frac{x}{4}$ or one quarter x in thickness. Then make

$$E_1\ E_{11} = a_1 .\ d \qquad (99)$$

Where $E_1 E_{11} =$ the amount to be substracted (inch scale) from moment of resistance or vertical v and representing the work of two angles.

Where $a_1 =$ the sum of the area of cross-section, in square inches, of the two angles.

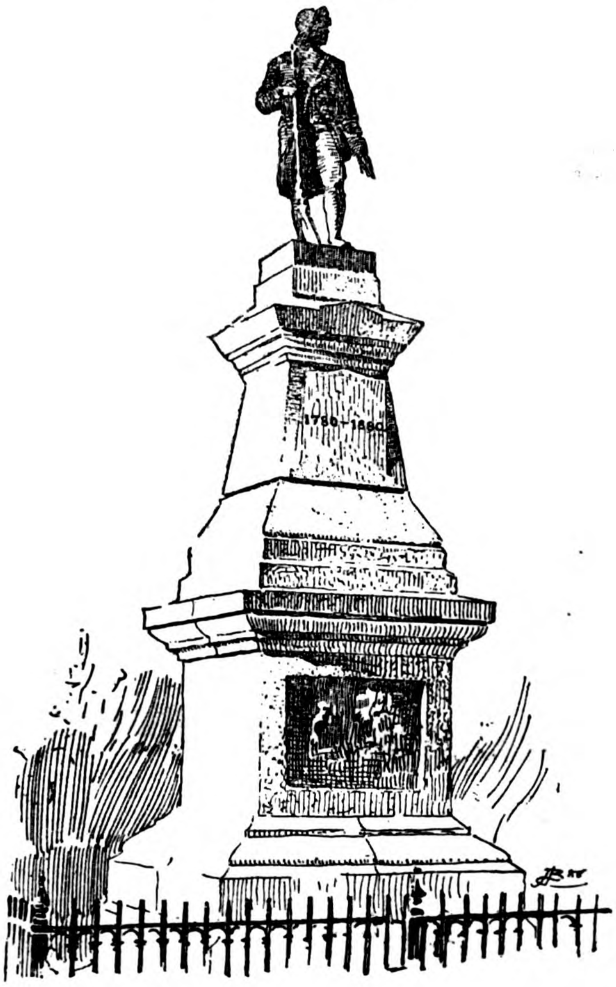
Where $d =$ the total depth, in inches, of the girder.

Where to drop off Plates. Now draw through E_{11} a parallel to base of figure $C\ G$, divide $E_{11}\ E$ into as many parts as we decide to use thicknesses of plates (four in our case) and draw parallel lines to base $C\ G$ through these parts. Vertically over the points where these lines intersect the curve or outline of figure $C\ D\ E\ F\ G$ will be the points at which to break off plates, as illustrated in drawing. This method, of course, is approximate, but it will be found sufficiently accurate for all practical purposes. It is not necessary that x or $E\ E_{11}$ be divided into equal parts. Had we decided to use plates of varying thicknesses we should simply divide $E\ E_{11}$ in proportions to correspond to thicknesses of plates *in their proper order*, beginning at E_{11} with plate immediately next to angles and ending at E with extreme central outside plate. An example, more fully illustrating the above, will be given in the chapter on plate girders.

LOUIS DE COPPET BERG.

EARLY SETTLER MEMORIALS.[1] — XIV.

VAN WART MONUMENT.



New Monument to Paulding at Tarrytown.

IN 1829, the citizens of Westchester County, N. Y., erected, in the graveyard attached to the Presbyterian church at Greenburgh, a monument to the memory of Van Wart. It is inscribed as follows: "Here repose the mortal remains of Isaac Van Wart, an elder in the Greenburgh Church, who died on the 23d of May, 1828, in the 69th year of his age. Having lived the life, he died the death of the Christian.

"The citizens of the County of Westchester erected this tomb in testimony of the high sense they entertained for the virtuous and patriotic conduct of their fellow-citizen, as a memorial sacred to public gratitude.

"*Vincit Amor Patriæ.* Nearly half a century before this monument was built, the conscript fathers of America had, in the Senate Chamber, voted that Isaac Van Wart was a faithful patriot, one in whom the love of country was invincible, and this tomb bears testimony that the record is true.

"Fidelity. On the 23d of September, 1780, Isaac Van Wart, accompanied by John Paulding and David Williams, all farmers of the County of Westchester, intercepted Major André on his return from the American lines in the character of a spy, notwithstanding the large bribes offered them for his release, nobly disdained to sacrifice their country for gold, secured and carried him to the commanding officer of the district, whereby the dangerous and traitorous conspiracy of Arnold was brought to light, the insidious designs of the enemy baffled, the American army saved and our beloved country free."

OLD PAULDING MONUMENT AT TARRYTOWN.

In May, 1853, a public meeting was held in Tarrytown, N. Y., "for the purpose of considering the propriety of erecting a monument commemorative of the capture of André." This meeting grew out of a fear that the actual ground where the event took place would become a matter of dispute, because of the natural and artificial changes in the topography of the locality incident to improvements, as well as "the very proper desire to put up in what was the

[1] Continued from No. 649, page 264.

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most beautiful region on the river some work of art that would embellish and commemorate an historic spot." Besides, the capture of André had become the common property of the world in poetry, history and art, the subject of romances, and the favored theme of orators and statesmen. The locality itself had become a trysting place, a kind of Mecca for English visitors.

The purpose of the above meeting was really to accept the propositions of the Inspectors of State Prisons, "to furnish a suitable monument for the commemoration of the capture of André, properly inscribed, provided the citizens of Tarrytown and the County of Westchester would erect the same and keep it in repair," and that of Mr. Taylor, "who agreed to give the necessary land for the site of the monument, a plot of twenty feet square." After accepting these gifts, the meeting appointed a committee of twenty-seven members, whose duties were to collect money "to build a firm and desirable base or foundation for the monument, to enclose the same with an iron railing, and to pay the expenses attending the laying of the corner-stone and the dedication."

The corner-stone was laid on the 4th of July following and the dedication of the structure took place on the 7th of October. Both occasions were attended by large numbers of military and civic bodies and distinguished citizens of the State. On the first occasion, the oration was delivered by Hon. James T. Brady. On the second, the opening address was made by Governor Horatio Seymour, who, in a long speech, in which he dedicated the monument and declared his great interest in the subject that brought them together, did not even mention the names of André's captors. The oration was delivered by Hon. Henry J. Raymond and was in every respect a complete and noble effort. In it he spoke of Nathan Hale, and, for the first time since this noble martyr went to his unknown grave, was the voice of one of his countrymen fitly raised in his behalf.

The monument is made of Sing-Sing marble. On one side of the die are cut these words: "Their conduct merits our warmest esteem. They have prevented, in all probability, our suffering one of the severest strokes that could have been meditated against us."—*Washington.*

On the other side is the following: "On this spot, the 23d day of September, 1780, the spy, Major John André, Adjutant-General of the British Army, was captured by John Paulding, David Williams and Isaac Van Wart, all natives of this county. History has told the rest. The people of Westchester County have erected this monument as well to commemorate a great event as to testify their high estimation of that integrity and patriotism which, rejecting every temptation, rescued the United States from most imminent peril, by baffling the arts of a spy and the plots of a traitor. Dedicated October 7, 1853."

MONUMENT TO DAVID WILLIAMS.

David Williams moved from Westchester County to the town of Livingstonville, Schoharie County, in 1806, and died there in 1831. He was buried with military honors and followed to his grave by a large concourse of people. For several successive years Judge Murphy, his god-son, visited Washington and urged Congress to erect a fitting monument to the captor's memory, but he appealed to deaf ears. On the 4th of March, 1876, the remains of Williams were removed to the cemetery of Rensselaerville, and on the 19th of July of the same year they were again removed to the old Stone Fort at Schoharie Court-House, escorted by a large procession.

On the 1st of May, 1876, the Legislature of the State of New York appropriated the sum of two thousand dollars for the purpose of "erecting a suitable monument in the cemetery grounds of the Revolutionary Stone Fort at Schoharie Court-House to commemorate the virtues and memory of David Williams, one of the captors of Major André, to be expended under the supervision of Daniel Knower, Ralph Brewster and Judge Charles Holmes." This appropriation was also opposed by a member who gave the same reasons for his action that were used by Major Tallmage in Congress in 1817.

These commissioners issued the following inviting appeal "to any county, city, association, literary club, or individual, who may subscribe not less than two hundred or more than eighteen hundred dollars in addition to the two thousand appropriated by the State, shall have their names inscribed on one of the faces of the monument or on a marble tablet to be erected in the Fort, as the artists who may design the monument may think most appropriate. It is proposed to appoint one or more of the most distinguished artists and sculptors in the State to design the monument and make it a work of art appropriate to the event." This tempting statement did not touch the hearts of the people of Schoharie County, and the commissioners erected "a plain monument."

The ceremonies of laying the corner-stone took place on September 23, 1876, the ninety-sixth anniversary of the capture of André. They were attended by the usual presence of military and civic organizations, many distinguished citizens, two grandsons of Williams, and many of his descendants. The oration was delivered by Mr. Grenville Tremain of Albany.

A book, called the "*Centennial Celebrations of the State of New York,*" for which the State appropriated five thousand dollars, contains the following description of the monument, furnished by Mr. Knower. "It is a fine block of Massachusetts marble, and the work is artistically executed. The height of the monument is twenty-three feet and nine inches. The following inscriptions, the production of Mr. Knower himself, are engraved on the monument:

"HERE REST THE REMAINS OF
DAVID WILLIAMS,
ONE OF THE CAPTORS OF
MAJOR ANDRÉ.
DIED IN SCHOHARIE COUNTY
AUG 2D 1831
AGED 76 YEARS, 6 MOS, 8 DAYS.

"He with his compatriots, John Paulding and Isaac Van Wart, on the 23d of September, 1780, arrested Major John André and found on his person treasonable papers in the handwriting of General Benedict Arnold, who sought by treachery to surrender the military Post of West Point into the hands of the enemy. In resisting the great bribes of their prisoner for his liberty, they showed their incorruptible patriotism. The American army was saved and our beloved country became free.

"FIDELITY.

"By authority of Congress, 1780, a silver medal was voted to them, and presented to the captors by General Washington, at a dinner to which he invited them while the army was encamped near Verplank's Point.

"VINCIT AMOR PATRIAE.

"General Washington's letter to the President of Congress, October, 1780: 'The party that took Major André acted in such a manner as does them the highest honor and proves them to be men of great virtue.'

"NANCY BENEDICT
WIFE OF
DAVID WILLIAMS
DIED AUG. 5, 1844, AGED 87 YRS. 6 MS. 8 DS.

"This monument was erected by the State of New York from an appropriation made in the Centennial year of 1876, by a bill introduced by Senator W. C. Lamont, under the following State Commissioners: Daniel Knower, Ralph Brewster and Charles Holmes."

And thus will the memory of David Williams go down to posterity in the Stone Fort at Schoharie Court-house.

In the fall of 1830, the corporation of the city of New York invited Williams, the survivor of the three, by special messenger, to be present in that city at the celebration of the French Revolution. He was drawn, with other heroes of 1776, in a carriage at the head of the procession and attracted much attention. At one of the schools he visited he was presented with a silver cup, and at another with a silver-headed cane, the stem of which was made out of a *chevaux de frise* used at West Point during the Revolution.

NEW PAULDING MONUMENT AT TARRYTOWN.

The public meeting, before mentioned, that was held in Tarrytown in May, 1853, for the purpose of accepting the proposed gift of a monument to John Paulding, and to provide means for the expense of laying the corner-stone and dedicating the monument, was the first effort towards the organization of the "Monument Association of the Capture of André."

It was incorporated in November, 1879, agreeably to the laws of the State of New York. In the early part of 1879, the Association determined to celebrate the one hundredth anniversary of the capture of André, and to erect a "bronze statue," because the "original plan" of a monument to Paulding, "was felt to be inadequate at the end of twenty-seven years." To accomplish these objects, the Association procured from the State, through the efforts of Hon. D. O. Bradley, the sum of one thousand dollars, and two hundred and seventy persons, gave five thousand four hundred and fifty-four dollars more.

The Association went seriously to work to provide for the success of the dedicatory ceremonies, by appointing eighty-six vice-presidents, forty-seven committee-men, and twenty secretaries. It invited, by the thousands, the most distinguished citizens of the United States to be present on the occasion, besides a large number of military and civic organizations. An immense procession preceded the exercises, and all thousands thus gathered together, met on Mount André, under a great tent, on the morning of the 23d of September, 1880, to do honor to the three captors and unveil a statue of Paulding.

They were made happy and patriotic by music from Gilmore's band; by "a brilliant floral display, consisting of geraniums, tuberoses and other flowering plants;" by the cool breeze from the majestic Hudson, and burning words of grateful tribute to the virtuous dead from silver-tongued orators.

The exercises were opened by an address from the President of the day, Hon. Samuel J. Tilden, followed by a prayer by Rev. Alexander Van Wart, the aged son of one of the captors.

Mr. Orlando B. Potter then read an historical paper.

The oration was delivered by Hon. Chauncey M. Depew. If not as brilliant and inspiring as that delivered twenty-seven years before, by Hon. Henry J. Raymond, at the same place on a like occasion, it was an extremely interesting and valuable contribution to the literature of the event. Nor did the orator neglect the forgotten life and deeds of Nathan Hale.

The new monument, thus imposingly dedicated is "a rejuvenation and elaboration of the old one," with the addition of a bronze statue

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illustrating Paulding in the act of listening, and a bronze bas-relief, representing André offering his watch to his captors. The work of the Association in making more adequate the "inadequate plan of the original monument," consisted in cutting the spire of the old monument into an ugly shape for the placing of the statue, and procuring the bas-relief, all at a cost of fifteen hundred dollars. The origin of the statue is explained in large letters on the face-side of the plinth: "This statue, the gift of John Anderson, a citizen of Tarrytown, was placed here September 23, 1880." Its cost was twenty-five hundred dollars. The statue and bas-relief was contracted for by Mr. Maurice J. Power, of New York. The former bears on its plinth the name of Wm. R. O'Donovan, and the latter, Theo. Bauer. The Association also published a book in 1881, entitled "*Centennial Souvenir of the Monument Association of the Capture of André*," which is quite as remarkable for its omissions as its commissions. It contains one hundred and sixty-seven pages, and sold for two dollars a copy. It pretends to give a full account of what has been done for the memory of the captors, yet it does not give the inscription on, or history of the old monument erected in 1853. Nor does it state that the monument does not stand on the spot where André was captured, as is generally understood. When the monument was erected the land on the north side of the brook, that runs down the hill to the river, including the place of André's capture, was owned by an Englishman who displayed intense hostility to the project. The monument really stands on the south side of the brook, thirty or forty feet from the exact place of the capture.

Of the statue and bas-relief there is little to be said, though in passing, it might be noticed that either Paulding was left-handed, or the powder-horn is on the wrong side of the body.

The statue, in bronze, was not completed in time for the celebration, and the plaster copy, bronzed over, was used, in its stead, for the time being.

The face of the statue was copied from an old portrait of Paulding, and the bas-relief is a reproduction of a current picture, long in existence. T. H. BARTLETT.

The Major Tallmage, who opposed the Congressional bill appropriating money for the erection of a monument to the captors of André, was a classmate of Nathan Hale at Yale College. He was a fine student and a capable officer in the Revolutionary war, emerging from it with the title of Colonel. By particular direction of Washington he was ordered to report to North Castle on the evening of the very day upon which André was brought to this military post by Paulding, Williams and Van Wart. He was the first, from observing the deportment of the prisoner, from watching the manner in which he walked to and fro on the floor, and turned his heel to retrace his steps, to suspect that he was bred to arms, and was an important British officer.

From this time forward, down to that of the execution of André, Major Tallmage was charged with his custody, and was almost constantly with him. He commanded the escort that conducted him to Lower Salem. It was into his hands that André there placed, for perusal his first letter to General Washington, acknowledging his true character. It was under his charge again, with a strong guard, that André was removed to Robinson's House, and thence to West Point, again to Stony Point, and thence to Tappan, where the court-martial took place. From the Stone-House, where André was confined, Tallmage "walked with him to the place of execution, and parted with him under the gallows," "overwhelmed with grief," he says, "that so gallant an officer and so accomplished a gentleman should come to such an ignominous end." In his narrative of his intercourse with André, he refers to Hale as follows: "Before we reached the Cove, André became very inquisitive to know my opinion as to the result of his capture. In other words, he wished me to give him candidly my opinion, as to the light in which he would be viewed by General Washington and a military tribunal, if one should be ordered. This was the most unpleasant question that had been propounded to me, and I endeavored to evade it, unwilling to give him a true answer. When I could no longer evade his importunity or put off a full reply, I remarked to him as follows: 'I had a much loved classmate in Yale College, by the name of Nathan Hale, who entered the army in the year 1775. Immediately after the battle of Long Island, General Washington wanted information respecting the strength, position, and probable movements of the enemy. Captain Hale tendered his services, went over to Brooklyn and was taken just as he was passing the outposts of the enemy on his return.' Said I with emphasis, 'Do you remember the sequel of this story?' 'Yes,' said André, 'he was hanged as a spy. But you surely do not consider his case and mine alike?' I replied, 'Yes, precisely similar, and similar will be your fate.' He endeavored to answer my remarks, but it was manifest he was more troubled in spirit than I had ever seen him before."

At the close of the war, Tallmage lived in Litchfield, Conn., and was a member of Congress for sixteen successive years. No one friend could speak of another with more enthusiasm and appreciation than Tallmage wrote of André. He cried over the charms of André's conversation. "I am sure he will go to the gallows less fearful of his fate, and with less concern than I shall behold the tragedy. Had he been tried by a court of ladies, he is so genteel, handsome and polite a young gentleman that I am confident they would have acquitted him."

ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

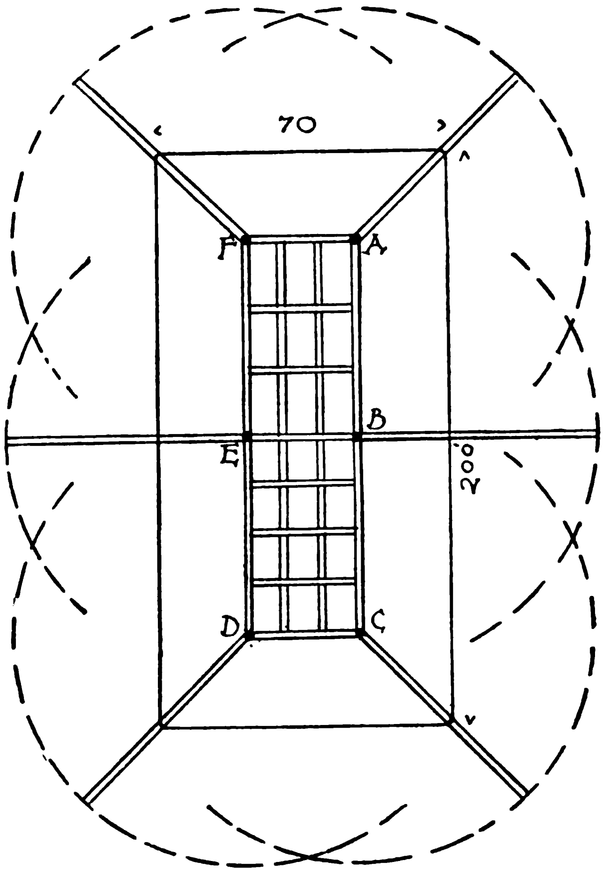
CANADIAN PACIFIC RAILROAD STATION, MONTREAL, P. Q. MR. BRUCE PRICE, ARCHITECT, NEW YORK, N. Y.

[Gelatine Print, issued only with the Imperial Edition.]

THIS view was made at this stage to show the derrick system devised for setting up the outer walls of the building. The building is 70′ x 200′, a true rectangle, with the four "fronts" of heavy blue limestone masonry, averaging three feet in thickness. The system consists of a heavy trestle, built up in the centre of the building of heavy spruce piling timbers as high as the level of the top-course of stonework.

On top of this trestle six derricks are placed — one at each corner and one at the centre of each lateral side, in the manner shown.

On each longer side of the building are three drums and an engine for working the three derricks of each side. Each boom is long enough to overlap its neighbor, so that with six gangs of setters,



masons and laborers, each gang has practically three derricks to call upon. That is, the arc of B overlaps the arc of A and C, so that whilst B can be helping A with a stone at the north corner, the setters of B derrick can be down towards the south end and getting material from C derrick. This is often the case; for whilst C derrick is loaned to B, C setters will be cutting and fitting a big block just received.

The derricks work very rapidly, and will lift a stone from grade to fourth-floor level in something like forty seconds.

The derrick plant cost about $11,000, and was designed by Mr. P. Alex Paterson, C. E., Chief Engineer of the Canadian Pacific Railroad system, and his assistants on the works, Mr. Stuart Howard, C. E. The whole plant has proved most effective and economical. By it the contractor, raised the building from the water-table level of first floor to level of third-story window-sills, a height of thirty-five feet in twenty-eight working days. In a fireproof building 200′ long by 70′ wide, with heavy walls in and out, this is a first-class showing. The contractors are Wm. Davis & Sons, of Ottawa. They say the plant has, by its great economy of time and labor, already paid for itself.

FIRST PRESBYTERIAN CHURCH, PEORIA, ILL. MR. WARREN H. HAYES, ARCHITECT, MINNEAPOLIS, MINN.

THIS building is to cost $35,000.

FOYER AND MUSIC-ROOM FOR E. LAUTERBACH, ESQ., NEW YORK, N. Y. MESSRS. A. ZUCKER & CO., ARCHITECTS, NEW YORK, N. Y.

BUILDING FOR DANIEL A. LORING, ESQ., NEW YORK, N. Y. MESSRS. LAMB & RICH, ARCHITECTS, NEW YORK, N. Y.

THIS fireproof building is to be used for bachelors' apartments, offices and studios. It will be finished in about a year.

HOUSES AT LOS ANGELES AND SANTA MONICA, CAL. MR. ERNEST A. COXHEAD, ARCHITECT, LOS ANGELES, CAL.

SPIRE OF ST. PAUL'S, NEW YORK, N. Y. DRAWN BY MR. C. H. ISRAELS.

TAPPING A VOLCANO FOR SULPHUR. — A scheme is under consideration in Mexico for tunneling the volcano of Popocatapetl through the wall of the crater, in order to reach the immense sulphur deposits inside the mountain. A narrow-gauge railway will connect the tunnel with the town of Amecameca, which, in turn, will connect with the Morelos road leading to the national capital. — *English Mechanic.*

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DRY-ROT IN TIMBER.[1]

WARNINGS.

Column at Ravenna.

NO wood which is liable to damp, or has at any time absorbed moisture, and is in contact with stagnant air, so that the moisture cannot evaporate, can be considered safe from the attacks of dry-rot (1, 3, 4, 5, 7, 9, 10, 17).[2]

Any impervious substance applied to wood which is not thoroughly dry tends to engender decay: Floor covered with kamptulicon and laid over brick arching before latter was dry (16); cement dado to wood partition (1), the water expelled from dado in setting and absorbed by the wood had no means of evaporation.

Woodwork coated with paint or tar before thoroughly dry and well seasoned is liable to decay, as the moisture is imprisoned.

Skirtings and wall panelling very subject to dry rot (4, 9, 17), and especially window-backs (4, 17), for the space between the woodwork and the wall is occupied by stagnant air; the former absorbs moisture from the wall (especially if it has been fixed before the wall was dry after building), and the paint or varnish prevents the moisture from evaporating into the room. Skirtings, etc., thus form excellent channels for the spread of the fungus (9).

Plaster seems to be sufficiently porous to allow the evaporation of water through it (1), hence, probably, the space between ceiling and floor is not so frequently attacked, if also the floor boards do not fit very accurately and no oil-cloth covers the floor.

Ploughed-and-tongued floors are disadvantageous in certain circumstances, as when placed over a space occupied by damp air, as they allow no air to pass between the boards and so dry them (3, 4).

Beams may appear sound externally and be rotten within (8, 14), for the outside being in contact with the air becomes drier than the interior. It is well, therefore, to saw and reverse all large scantling (14).

The ends of all timber, and especially of large beams, should be left free (for it is through the ends that the moisture chiefly evaporates). They should on no account be embedded in mortar (8).

Inferior and ill-seasoned timber is evidently to be avoided (7, 17).

Whatever ensures dampness and lack of evaporation is conducive to dry-rot, that is to say: —

Dampness arising from soil (3, 4, 7).

Dampness arising from walls, especially if the damp-proof course has been omitted (15).

Dampness arising from use of salt sand (15).

Dampness arising from drying of mortar and cement (1, 8, 16).

Stagnation of air resulting from air grids getting blocked with dirt (4), or being purposely blocked through ignorance. Stagnation may exist under a floor although there are girds in the opposite walls, for it is difficult to induce the air to move in a horizontal direction without some special means of suction (2, 6). Corners of stagnant air are to be guarded against (7, 12).

Darkness assists the development of fungus; whatever increases the temperature of the wood and stagnant air (within limits) also assists (1, 2, 5).

Hot-water pipes are especially prejudicial, for they heat the woodwork, etc., by conduction, and are liable to leak (3).

The leaving of chips, shavings, etc., under boarded floors is a most reprehensible practice, for the chips are very liable to attack, lying, as they often do, on the damp ground (3, 12).

SUGGESTIONS.

All ground under boarded floors should be covered by an impervious substance — concrete, blue lias lime (3), asphalt (4), Portland cement (2).

For churches, solid wood-block flooring is preferable to joists and boards (3).

To ensure the thorough dryness of a boarded floor the boards may be laid three-eighths of an inch apart (3), or small gratings may be inserted at intervals (1).

NOTES ON THE FOREGOING.

Eremacausis.— In several of the above cases there has been complete decay yet no signs of fungus. This may have resulted from eremacausis, which may be considered as "wet-rot." The eremacausis of woody fibre is due to the gradual oxidation of its lignin and other chemical constituents in presence of atmospheric oxygen and water, the O ultimately taking the C to form CO_2 and the H to form H_2O. The H, however, becomes more rapidly oxidized than the C, and the formation of a brown snuff-colored powder or *humus* (similar to that produced by dry-rot fungus) results, which is much richer in C than the woody fibre. Moisture is a necessary condition of the process, and the most suitable temperature is about 60° F.

Disruption of concrete by fungus.— In 2 a case is referred to in which the mycelium of the fungus had disrupted a layer of concrete. I think a more likely explanation is as follows: — The foundations have settled, the concrete under the boarded floor has become cracked, and the fungus attacking the timber has spread in the direction of greatest moisture, and so over the concrete and down the crack to the damp soil beneath.

Fungus passing through walls and growing in the soil.— The mycelium of the fungus has the power of passing its nitrogenous and nutrient substances from the older to the younger growing parts. It thus has the power of growing in, and on the surface of the substances which afford it no nourishment. It may in consequence creep over brickwork, plaster, and even glass and iron, and thus reach woodwork at some distance. This growth is greatly assisted if the surfaces over which it spreads are themselves damp. In this way it may pass through the interstices of plasterwork and brick walls, and ramify in the soil. It is also able to convey its moisture from a distance, so that it is necessary that everything in the neighborhood of woodwork should be dry, and that the soil under boarded floors should be covered by an impervious layer.

Fungus growing in air-grating. — In 6 and 12 the fungus is said to have been growing "in the ventilating opening," and "in a draught." With regard to the first, it may be remarked that ventilation is not at all a necessary consequence of the insertion of an air grid, inasmuch as there must be a want of equilibrium resulting from difference of density in the air on the inside and outside of an inclosed space. The fungus may therefore have found the air in the ventilating opening as moist and stagnant as elsewhere; and the case shows that it is necessary to introduce some method of suction to ventilate under floors.

Fungus growing in a draught.— Secondly, it is not the mere movement of the air, but the evaporation which usually results, that is detrimental to the fungus; if, therefore, the locality is a very damp one, and the incoming air is as damp as the outgoing, the fungus may quite possibly flourish "in a draught." Moreover, it must be remembered that the fungus is able to transport moisture, and also condense it from the air.

Stagnant air between joists. — Case 2 seems to indicate that there was ventilation under the church floor, and yet the air was sufficiently stagnant to allow the under surfaces of the boards to remain damp. I think the current of fresh air should be made to move in the direction of the joists, and not across them, for it is quite possible that in the latter case the air between the joists may stagnate.

Decay at contact of different timber.— In case 8 is an instance of peculiarity sometimes observed that, when pieces of two different kinds of wood are placed in contact; the harder is more liable to decay.

Durability of larch.— It is to be noticed in case 11 that the joists of *larch* remained sound. Larch is better able to withstand the effects of moisture than fir and pine.

Germs in walls and from dead bodies.— In case 2 it was concluded that germs of the fungus were in the walls or had arisen from bodies buried in the ground. Spores carried hither and thither by a variety of means may have settled *on* the walls, but it is not probable that the dead bodies could have had any association with their presence. Bacteria they very likely would produce, but the "dry-rot" spore is far more highly organized.

Spontaneous generation.— In one instance the origin of the germs is attributed to spontaneous generation. This, of course, is a theory now discarded.

Wood bedded in mortar.— Wood bedded in mortar is liable to decay, for the water of the mortar is absorbed by the wood; and, in the process of setting, the mortar may decompose some of the organic substances of the fibre, especially if the lime has not been thoroughly slaked, as it then tends to absorb the elements of water from the substances near it.

Removal of infected timber.— It is safest to remove all infected timber, and burn it. Merely scraping away the fungus, and then coating the timber with an impervious substance will frequently assist the growth of internal disease, as it imprisons the moisture.

Seasoned and unseasoned wood.— Under favorable conditions of temperature and dryness, ill-seasoned wood may stand as well as seasoned; but it is far more liable to decay in a warm damp atmosphere, as it contains more fermentable substances, and affords nourisment for a far more luxuriant growth of fungus. When, however, the wood is to be creosoted, the sap-wood is better than the heart-wood, as it is more porous and absorbs the oil better.

Species of fungi.— It is dangerous to identify a fungus by such very meagre descriptions as are given in the MSS., especially when no reference is made to the form of its fructification. Still I think it probable that whereas in the majority of cases *merulius lacrymans* is the destructive agent, in cases 7 and 14 it may have been *polyporus vaporarius*. The effects on the wood are the same in the case of *merulius* and *polyporus*, except that with the latter the decayed wood becomes marked with streaks and patches of reddish brown,

[1] A Report presented to the Science Standing Committee by W. H. Bidlake, M. A. Cantab. *Associate.*

[2] These numbers and others which follow refer to the cases particularized ater.

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and it is known in timber yards as "red rot." The mycelium of the fungus is also whiter. Unlike merulius, this fungus is found wild in the forests, and the timber is often attacked by it as it lies felled on the ground. Professor Hartig states that the spores often become lodged deep in the cracks, and are there imprisoned by the swelling of timber as it floated down to the ports. In the close ship's hold, or afterwards in the stack yards, the spores germinate, and the timber on being sawn is found to contain furrows of red powder. — W. H. BIDLAKE, M. A. Cantab.

DIGEST OF VARIOUS NOTES AND MSS. REFERRING TO "DRY-ROT" IN TIMBER.

(1) *Architect.* — Boult, J., Esq. *Locality.* — Liverpool and London Chambers. *Position.* — Partitions to height of 4 feet and flooring beneath. *Circumstances.* — Wood partitions dividing office finished with cement dado, 4 feet high. All timber above dado sound. *Ventilation.* — Floors fireproof, hence lower part of partitions formed air-tight cells. *Heating, etc.* — Rooms kept warm. *Treatment.* — New partitions with 2 small pieces of perforated zinc inserted between each pair of quarters, near floor on one side and ceiling on the other. *Result.* — Quite satisfactory. *Notes.* — Water expelled from dado in setting had no means of escape. No fungus. Decay due probably to eremacausis.

(2) *Architect.* — Ferrey, B. E., Esq., F. S. A. *Locality.* — Old Church in Worcestershire. *Foundations.* — 12 inches clear space below joists. *Timber.* — Appeared well seasoned. *Position.* — Floor. *Circumstances.* — Rot appeared five years after restoration and re-seating. Slight moisture on underside of boards. Oak joists fairly dry. *Ventilation.* — "Perfect." Air gratings in walls, and 4-inch earthenware pipes under passages. *Heating, etc.* — Hot air with gratings in passages.

(3) *Architect.* — Ferrey, B. E., Esq., F. S. A. *Locality.* — Old Church in Somersetshire. *Position.* — Floor and block of ceiling. *Circumstances.* — Possible leakage from hot-water pipes. Shavings left under floor; on them the fungus was especially luxuriant. Floor tongued and grooved. *Ventilation.* — *None.* Stone ventilators inserted, but only perforated half through thickness of wall. *Heating, etc.* — Hot water pipes. *Treatment.* — Shavings removed, pipes repaired, ground covered with layer of blue lias lime, timbers soaked with a solution of ½-pound zinc sulphate and ½-pound copper sulphate to 4 gallons of boiling water. *Notes.* — In some parts there was a little, though insufficient ventilation; here the fungus was not much developed.

(4) *Architect.* — Holden, J., Esq. *Locality.* — Warehouses, New Brown St., Manchester. *Foundation.* — 2 feet to 2 feet 6 inches space under boards. *Position.* — Basement floor, sills, shutters, etc., and stairs. *Circumstances.* — Floor 3 inches tongued and grooved. Sills and shutters attacked to 3 feet 6 inches high, and where stairs were connected with floor; fungus passing upwards in the strings. *Ventilation.* — Space under floor ventilated by vertical air shafts from bottom of window areas. These were blocked with dirt. *Treatment.* — Ground covered with asphalt; walls washed with solution of sulphuric acid; ventilating openings altered so as to prevent their being stopped; communication with flues where possible. *Result.* — Successful. *Notes.* — Under boards a mass of fungus, beautifully white in parts; timber sound near fireplace, where there was slight ventilation. Timber in adjoining warehouse sound, although there was no means of ventilation, but the ground had, in this case, been covered with asphalte.

(5) *Architect.* — Holden, J., Esq. *Locality.* — House, Park Place. *Timber.* — Red deal. *Position.* — Beam carrying wall over opening in basement. *Circumstances.* — Ill-ventilated corner. Kitchen department in vicinity. *Ventitation.* — Sufficient. *Heating.* — Kitchen warmth. *Treatment.* — Fungus removed, beam soaked with gas tar. *Result.* — Unsuccessful. *Notes.* — Hence iron girder substituted.

(6) *Architect.* — Holden, J. Esq. *Locality.* — Mill, Salford. *Position.* — Under ground floor. *Ventilation.* — Air openings on each side of building, and through sleeper walls. *Notes.* — Strongest growth of fungus close to ventilating opening. The ground beneath was full of threads of fungus continuous with that above.

(7.) *Architect.* — Mathews, J. D., Esq. *Locality.* — House. *Position.* — Landing of cellar steps. *Circumstances.* — House "jerry-built," finished and untenanted a year. In back cellar, under stone steps, ground of loose soil left, not having been flagged; wood landing over attacked by fungus, which spread along wall to cellar. *Ventilation.* — Corner of stagnant air. Cellars only ventilated occasionally by window. *Notes.* — Wood assumed brownish-red color thickly covered with sickly-whitish fungus. very luxuriant, often of stalactite form. Sickly smell.

(8) *Architect.* — Paull, H. J., Esq. *Locality.* — Sir F. Crossley's Orphan Home, Shirkcote Moor, Halifax. *Timber.* — Crown memel timber and oak. *Position.* — Floors, beams, etc. *Circumstances.* — Structure built up to first and second floors then left four years unprotected from weather. Floor beams, 18 inches by 14 inches, sawn and reversed, each trussed with piece of oak, 4 inches by 3 inches, ends on stone templets, built closely in wall with *mortar*. These, without exception, rotten, decay spreading through centre of each beam, sometimes four or five feet, sometimes the whole length. Oak in all cases more decayed than deal. Fungus extended through walls, so that much brickwork had to be taken down. It thus spread from one part to another. *Treatment.* — All affected parts taken down and removed. *Notes.* — Beams showed little indication of decay externally, but the centre of each was rotten. The fungus appeared on the surface like a fine cobweb; the ramifications branching out in all directions of cream-white and dark-brown color.

(9) *Architect.* — Paull, H. J., Esq. *Position.* — Under-ground floor. *Circumstances.* — Fungus crept up from under floor behind. skirting, thence under tile floor of hall to skirtings on opposite side, then through wall into garden where it ramified in the soil. *Ventilation.* — Space under floor unventilated.

(10) *Architect.* — Bridgen, R. B., Esq. *Locality.* — Children's Hospital, Pendlebury. *Position.* — Wood casing of electric bell wire. *Circumstances.* — Casing bedded in concrete; floor of corridor close to skirting, to which the rot rapidly spread. *Treatment.* — Cement skirting substituted; walls twice washed with solution of corrosive sublimate.

(11) *Architect.* — Redmayne, G. T., Esq. *Locality.* — House, Lake District. *Foundations.* — Dry stony ground overlying rock; rubble foundations; excavated 2 feet to 4 feet under floor. *Timber.* Red deal boards, larch joists. *Position.* — Floor, skirting, etc. *Ventilation.* — Fair current of air. *Treatment.* — Rotten wood replaced by new. *Notes.* — Window backs and skirting with blistered appearance; wood quite rotten behind a skin of paint; floor looked sound, but quite rotten within ⅛ inch of surface, and looked as if charred beneath; joists of larch sound; no signs of fungus.

(12) *Architect.* — Redmayne, G. T., Esq. *Locality.* — St. John's Church, Brooklands. *Foundations.* — Deep sandy soil; 5 feet to 8 feet space under floor. *Position.* — Door frame of space below organ chamber. *Circumstances.* — Space under organ chamber occupied by hydraulic blowing apparatus; fungus traced along floor to a log of wood, part of centring of vaulting, which had been left. *Ventilation.* — Space under nave well ventilated by large grids, but under organ was a stagnant corner. *Treatment.* — Walls washed with solution of corrosive sublimate, timber washed with carbolic acid, parts scorched with naphtha lamp. *Result.* — Successful.

(13) *Architect.* — Redmayne, G. T., Esq. *Locality.* — Schools at Tintwistle. *Foundations.* — Hillside; excavated out of rock; drained dry. *Ventilation.* — Ample ventilation. *Treatment.* — as in No. 12. *Result.* — Successful. *Notes.* — Stringy white fungus appeared in the neighborhood of a draught.

(14) *Architect.* — Redmayne, G. T., Esq. *Locality.* — House, Lancaster. *Timber.* — Pitch pine. *Position.* — Log. *Notes.* — Log externally sound, but the centre was filled with long strings of fungus, tough and like wet white kid; timber wet and seemed full of resin; broke short like carrot.

(15) *Architect.* — Redmayne, G. T., Esq. *Locality.* — House, Northwich. *Foundation.* — Quick sand. *Position.* — Floor joists; window backs of ground floor. *Circumstances.* — Cellar, walls, and floors (flags laid on sand) wet, no damp-proof course; joists carried on plates, propped up from cellar floor with posts set on stone blocks; posts also rotten, as well as feet of rafters; furniture worm-eaten. *Treatment.* — Rotten timber removed; boards and walls washed with carbolic acid; dry trench round house; vaulted cover with air grids; cellar and trench with concrete bottoms at level of footings with outward fall; cellar paving laid on sleeper walls, and cellar walls cemented outside. *Notes.* — Walls covered in places with black fungus growth, in beautiful delicate, seaweed-like sprays. Dampness of house probably in part due to the use of salt sand.

(16) *Architect* — Waterhouse, A., Esq., R. A. *Locality.* — House. *Position.* — Ground floor. *Circumstances.* — Floor laid over brick arching before latter was dry. *Ventilation.* — Floor covered with kamptulicon.

(17) *Architect.* — Waterhouse, A., Esq., R. A. *Locality.* — House. *Foundation.* — Sandy. *Timber.* — Inferior timber. *Position.* — Panelling. *Circumstances.* — Especially under window-sills; spread rapidly to floors and skirtings through house. *Treatment.* — Parts affected cut out; rest washed with solution ½-pound copper sulphate to 1 gallon of water. *Result.* — Successful.

STEEL IN FOUNDATIONS. — The use of steel rails for the foundations of large buildings has long been followed in the spongy soil of Chicago. Some of the more recent large structures have combined the use of steel beams with rails, notably the Edison Electric Light Company's building and the great auditorium in which the National Republican Convention has just been held. The Tacoma building, now being erected on the corner of Madison and La Salle Streets, under the direction of Holabird & Roche, architects, is the first to use steel beams exclusively for foundations. This building will be 12 stories and an attic in height, and is intended for offices. Its walls will therefore be very massive and the partitions will be supported on large pillars built up from the ground. The foundations for the walls and pillars consist, first, of a bed of concrete 2 feet thick, second, of steel I-beams of different dimensions, according to circumstances, crossed wherever necessary, and third, of cast-iron plates in the case of the columns. The beams stand on edge, are placed closed together and are long enough to extend from 6 to 7 feet outside of the columns. They are enveloped in concrete after being placed in position, to guard against oxidation and also to secure further rigidity. Over 120 tons of steel beams will be required for the foundations alone of this building. They were adopted in preference to steel rails, because their aggregate cost is about one-third less, as several tiers of steel rails would have to be used to secure the stiffness of the beams, thus more than covering the difference in the cost per ton. — *Iron Age.*

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BOOKS & PAPERS

In consenting to write the biography of Henry Hobson Richardson,[1] Mrs. Van Rensselaer entered on a task which was not easy to accomplish to every one's satisfaction. A memorial prepared at the instigation of friends presupposes that the work must be approached from that point of view which is likely to give the pleasantest impression of the subject of the biography, his good points must be brought out with strenuousness, his indifferent ones merely hinted at, and his bad ones, if he had any, passed over in silence. His personal character must, in short, be presented in its pleasantest light, and darker moods and selfish acts must go without comment. In the same way, though in a less degree, the friendly biographer feels impelled to dilate in warmest phrases on the successes and slur over the failures in his career.

In the next place, the present work is not only a biography of the man, but it is intended to be a critical consideration of his works and their architectural value, both at the present time and in the future. Here it may be well to say that we are far from sharing a quite common feeling that it is not possible to value properly an artist's work in his own day and time — particularly the works of an architect. If the appreciation of architecture rests upon real canons of criticism, if there are any absolute laws to which we may appeal in our endeavor to decide between good work and bad, we are surely as able to apply them to buildings finished yesterday as to works which have received the applause of centuries. It is often necessary to wait years or even centuries before a correct history of events can be written, simply because it is not possible to sooner get at all the facts. A building, however, is a single fact that can be examined from every point of view and can be gauged at any time according to the same standards of absolute worth that the world applies to older work. It is, then, a book with a compound motive, it is addressed to a double audience, to the layman who knew Richardson or who was interested in his work, and to the architect who is only interested from a professional point of view in what he accomplished and his reasons for doing what he did.

Mrs. Van Rensselaer is too conscientious a person and too good a critic not to be conscious of the pitfalls that surround such a devious path, but, also too skilled a writer not to be able to give her readers the impression that after all she has said pretty much what she really wanted to say. In one respect, at least, the task has been unusually easy. In dealing with the works of artists, the biographer usually feels called on to attempt the analysis of the motives which governed him in producing a given work and to reproduce, with the most wonderful subtilty of imagination, the course of reasoning which led to the result. Richardson had very emphatic motives for what he did, to which he was brought by very logical trains of reasoning, and it would not always be easy for a biographer to reproduce them; but fortunately for us there was one thing that Richardson liked to do more than anything else — to talk about himself and his work, rarely about himse.f alone, but always about his work, and he was so integral a part of his work that he could not, when talking about it, avoid talking about himself too, and at the end of a chat it was difficult for the listener (he could hardly be called a collocutor) to determine whether he had learned more about the work or the man who was doing it. The laughing apology that Richardson always made when he found he was working into one of his enthusiastic monologues was felt by the listener to be a quite unnecessary apology for any seeming egotism, and if the idea had not been suggested by the speaker, the undeniable fact that the discourse was somewhat one-sided would have been lost to sight in the pleasure of listening to the outbursts of real enthusiasm and in the vague wonderings why nature had not endowed other people with the same all-powerful supporter. It was, then, unusually easy for one who had understandingly listened to many of these exegeses to lay before her readers the logical development of the work that Richardson accomplished and to point with some certainty to the goal toward which his work in the future would have tended.

Considering the great individuality of the man, his personal magnetism, his lack of conventionalism, and the tremendous energy he put into his work, we are rather disappointed that more was not made of the strictly biographical part of the book. Those who knew him can fill in around the outlines of the sketch, which gives the essential facts of his personal career, but those who never found themselves refreshed by encountering, even briefly, this living hurricane will gather dissimilar impressions of a man who was impulsive and yet not inconsiderate, impetuous enough at times to overcome every obstacle, even if others were shouldered aside in the onrush, and yet kindly and loving to the farthest degree, unyielding when the point at issue must be gained for the good of his work — not his own good — preoccupied with his own work so that he was accused of being inconsiderate of the support he ought to give his fellow-architects, and yet ready to enter heart and soul into the enthusiasm of some pupil who was just beginning life for himself. But, as he felt that his work was himself, perhaps his biographer became imbued with the same belief and thought that, in considering the works, the reader would in every necessary degree divine what manner of man it was that wrought them.

In one thing we feel distinctly defrauded. A biographer tells the story in the language which custom has hallowed. If there is a *cachet* to the work, it is that of the writer, the dish is mixed according to his taste and the seasoning is the flavor of his literary style: the subject of the biography has no hand in it, and the individuality that stamped his life may never be perceived by the reader if he is not allowed to speak for himself in his own words. There is only one way in which one who has gone before can thus posthumously declare himself truly — by his letters, letters not written for publication, not treatises nor lectures, but the frank unfoldings of his inner self to those who really understand him. So good a conversationalist as Richardson must have had it in him to be a good letter-writer, and the almost entire absence of letters from this biography cannot but be regarded as a very regrettable, though apparently irremediable defect, — since probably the greater part of his correspondence during his life at Paris, when the agitating changes in the fortune of his family, were taking place, was addressed to one who naturally does not care to have these letters laid before the public, the few extracts that are given do not seem notable or individual, but rather dry and commonplace.

In the second part of her task, the difficulties were not so great; the accomplished results were accessible and in most cases the biographer knew from the creator himself why and how they had been accomplished and in what esteem he held them. Taking the work in almost chronological sequence, we are shown how step by step the architect worked into the conviction that there was for him only one style of architecture, and, if he was to do his best, only one class of buildings that he really cared to undertake. The real possibilities of the style he devoted himself to were not fully perceived by him until his trip to the south of Europe three or four years before his death, and it is probable that it was a grievous disappointment to him that the chance to mark his own advance was denied him by the awarding of the Albany Cathedral competition to another. Here there seemed to be a chance to put in play the inspirations acquired during his recent trip through Southern France and Spain, and to show how far beyond the work at Trinity Church the studies and opportunities of a mere decade had qualified him to go. The design for this building is familiar to our readers and is both imposing and attractive, though who can say to what farther point it might have been carried in the final studies and during construction? The causes that led to the miscarriage of this enterprise are typical of the man and the man's artistic conscience. The terms of the competition fixed a certain limit of cost and demanded a design in the Gothic style. Richardson disregarded both, the first because the sum named was too small to do what he wanted to have done, and the second because he did not like Gothic and felt that it was not as well suited to our day and country as that other style he loved to work in. To offset both these imprudences, he relied on the abstract merits of his solution of the problem and his powers of persuasion. It was, of course, an immoral thing to do and the rebuff was deserved, but one cannot help regretting that the attempt was not successful.

The Court-house at Pittsburgh, however, gave him, very shortly after, the opportunity that he failed to get at Albany, and it was an opportunity rather more in his peculiar line than the other would have been; and as he soon became thoroughly absorbed in it and often expressed the desire that he should be valued according to the success of this building rather than by any other work that had preceded it, it is not easy to see how, at the same time, he could have carried on two such buildings and have done credit to both chances. As his personal feeling about this building was so strong, it seems rather strange that a greater number of illustrations of it were not included amongst the many which so adequately illustrate this work. The great arched-passageway, spanning the street between the jail and the Court-house, is, no doubt, a feature in the whole scheme, but the gelatine print of it could have been replaced with great gain by one that would have told us something about the architecture of the main building. A great many more of the charming little sketches of the details of this building might have been added, too, and only increased our obligations to those who have, by their skill with the pen, done such satisfactory work in the way of illustrating points which it was not advisable to dilate on at length.

The scheme of such a work requires that the illustrations should have, at least, equal interest with the text, and both in quality and quantity this requirement has been heeded, and though the illustrations number only about one hundred, and though they might have been quintupled without beginning to exhaust the supply of acceptable subjects, they give the work the air of being most sumptuously illustrated; and though many of the subjects selected have already been made familiar to the readers of this journal, they are here often presented from new points of view, and their coördination and combination give them a value that is wanting to the same things scattered through the files of a periodical. We have done nothing toward showing our readers what Richardson did in the line of house-architecture, largely because we felt that in designing houses he was undertaking work to the acceptable execution of which his chosen vein of design did not successfully accommodate itself, and we find on comparing the houses here shown with his other works, that this opinion is only strengthened. There is a ponderous and

[1] "*Henry Hobson Richardson and his Works*," by Mrs. Schuyler Van Rensselaer, with a portrait and illustrations of the architect's designs. Boston and New York: Houghton, Mifflin & Co. 1888. Five hundred numbered copies, only, printed. Price, $20.00.

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repellant air about some of them which must make people feel that though it may be worth while that they should exist, it is particularly fortunate that more clients were not found who were willing to seclude themselves behind dungeon walls. In the house for Mr. Glessner at Chicago, however, a new vein seems to have been hit upon, and one which seems more likely to have really interested the designer than the houses for Mr. McVeagh or Colonel Hay, and though it is shown only by a very slight sketch, the plan is a very interesting one, although like many of Richardson's plans it can hardly be considered a thoroughly good one. Indeed, we are disposed to disagree with Mrs. Van Rensselaer and with Richardson himself, as to the merits of some of the plans which both regarded as particularly good, for instance, Austin-Hall, at Cambridge, is found by those who use it anything but convenient, while at North Easton the arrangement and size of the main stairway shows a reckless disregard of the canons of good planning. It would not surprise us to hear that the inadequacy and faulty arrangement of these stairs had been the cause of a serious disaster to a panic-stricken audience.

One of Mr. Richardson's minor aspirations was that he might be called upon to design a grain-elevator, as he felt that here was one of the brutal utilitarian problems which was wrongfully neglected, and that it only needed an example to set a limit to the erection of the ordinary unsightly masses that disfigure the lake shores of our Western cities. He seems to have had a chance to set an example as to how to treat one other class of structures which is usually neglected as being too hopelessly commonplace for any one to consider it and architecture in the same connection, for we find one of the chapters headed by a little vignette, which shows how he would treat an ice-house: it reveals how by a judicious management of the inclined plane and roofs a building may be built which will add to the beauty of the shores of our ponds, not be hurtful to it.

The vignette that heads the preceding chapter recalls a rather curious incident. The owners of the Fall River line of steamboats, the Old Colony Railroad, had long felt the need of an extra light-house at the entrance of Narragansett Bay, but, we believe, the Light-house Board did not feel that the case was as urgent as some others, and declined to authorize the erection of the desired beacon. Finally, the railroad offered to pay for the erection of the tower if Government would equip and maintain it. This proposition was accepted, and a search was made for the proper site. It was finally decided that the place for it was on a point forming part of the estate of Professor Agassiz who spends his summers at Newport, and who, not unnaturally, objected to the erection there of one of the usual whitewashed cylinders. But perceiving the real desirability of having a light there, he at length waived his objections, provided that the structure should be designed by a person selected by him. This being agreed to, Richardson was asked to make sketches, and, finally, the necessary drawings, which were then delivered to the Light-house Board for execution. Everything seemed to be satisfactorily and harmoniously arranged, and the steamboat pilots rejoiced in the belief that in another year their care might be slacked off one point, when it was discovered at Washington that the building could not be built as designed. However, as it was we believe nothing so serious that the substitution of iron for stone would not remedy, it is probable that the pretty little tower will be erected so as to appear outwardly as it was designed.

Perhaps the most interesting chapter in the book is that devoted to Richardson's methods of teaching, and it comes as near as mere words can come to explaining how it was possible for the work that emanated from his office to be so unquestionably the design of one and the same man, and yet that man one whose fingers rarely handled pencil and paper in the way that designers ordinarily use them. A less magnetic man would have found it impossible to bring his many pupils *en rapport* with him, and the buildings produced in such a man's work-room would have been but the dissimilar creations of designers of greater or less individuality, and could not have borne the impress of one man's artistic impulse. A man less well read, less thoroughly trained could not have successfully followed his course of evolving a design quite as often by a process of negation as in any other way, and no man of less capacity for gauging the real ability of his assistants could have secured and retained the help of the pupils who actually worked out his designs, but who worked them out in such a way that there was never any question as to whose mind it was that was controlling the development of the conception. It is a very common thing to hear an able draughtsman say that such or such a building which is credited to his employer was actually designed and worked out by himself, but though we know many of the men who have held leading positions in Richardson's office we never heard any of them advance such a claim in his own behalf. The relation between Richardson and his assistants was singularly loyal on both sides, and Mrs. Van Rensselaer does well and gracefully to dedicate to them this book which both in matter and manner fittingly marks an important period in the advance of architecture in America — and what one man did to make it noteworthy.

ONE of the late volumes in the "*Bibliothique d'Histoire et d'Art*" (published by Henri Laurens, Paris) is M. Paul Marmottan's "*Les Statues de Paris.*" It describes in an interesting manner some thirty-four statues, giving their history and in a few instances that of their predecessors (for several of them succeed monuments which were destroyed in the Revolution) not forgetting some timely information about the persons represented. M. Goutzwiller has illustrated the book with drawings which are, on the whole, very satisfactory.

The author has, we know not why, omitted several monuments. We do not find those of Louis Blanc and François Villon in the Place Monge, of Dante at the Collège de France, of Papin and Leblanc in the court of the Conservatoire des Arts et Métiers. The oldest statue described seems to be that of Henri IV on the Pont Neuf which dates back to 1818. This is not very old compared with those in other cities of Europe (even London has two or three which have seen a couple of centuries) but then one must not forget the revolutions. It would also seem that Paris, though a centre of the arts, has not so many statues as London, who outnumber hers by one-half. Of course we are speaking only of detached portrait statues, not reckoning those forming part of the architectural scheme of such buildings as the Louvre or the many ideal ones to be found in the Tuileries and Luxembourg gardens and elsewhere. Lutetia's "counterfeit presentments" can be seen, however, while many of the statues of the "modern Babylon" are practically invisible because of soot and grime, and in artistic merit the Parisian memorials would doubtless bear away the palm, though some of them are poor enough. It is curious to find that New York has almost as many statues as are catalogued in M. Marmottan's book.

COMMUNICATIONS

RUSTLESS-IRON HARDWARE.

STAMFORD, CONN., June 28, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — We note with much interest the editorial remarks in your issue of the 23d inst., on the subject of new material for builders' hardware, from which it is evident that your attention has not been called to a product which has lately been put on the market.

This, although not literally a new material, is practically such, by reason of the new effects and new qualities which have been produced. We refer to the employment of iron, both cast and wrought, the surface of which, after decoration and finish in any desired manner, is converted into a permanent and rustless oxide by treatment in the Bower-Barff furnace. You are doubtless familiar with the discovery by Messrs. Bower & Barff of the process which bears their name, whereby articles of wrought and cast iron are exposed at high temperature to the action of certain gases, the effect of which is to change the chemical composition of the metal on its surface, and to a considerable depth, converting it into the black or magnetic oxide of iron. This is a deep, lustrous black, beautiful both in tone and texture, and having the remarkable quality of being entirely unaffected by exposure either to the atmosphere or to handling. It requires no protection by lacquer or varnish of any kind, and is permanent and unchangeable.

Under license from the owners of the American patents covering the Bower-Barff process, we are now producing a great variety of ironwork, both wrought and cast, adapted to this treatment. It has been furnished for many large buildings, such for example as the "Rookery" Building, of Chicago, as well as for private houses of the most expensive kind. The effect of metal-work thus treated is especially pleasing in combination with natural wood of almost any variety. Its beauty cannot be reproduced by any process of illustration, nor fully appreciated without actually seeing samples of the work. We send you herewith one or two small specimens, an examination of which will, we think, convince you that this new product goes far towards meeting the requirements set forth in your editorial above referred to, especially when combined, as it may be, with other metals in cases where more display or elaboration is thought desirable. Yours respectfully,

YALE & TOWNE MFG. CO.

[When we first saw some plumbers' fittings finished in magnetic oxide of iron, we made up our minds that when proper occasion offered we would "call for" some door furniture finished in the same way, and we are pleased to known we shall only have to go into the market for them, and not have to wait for them to be made to order. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS

ARTESIAN WELLS IN NEW YORK CITY. — In a paper on the geology of Manhattan Island, read by Mr. James F. Kemp, before the New York Academy of Sciences, we find the following: Efforts have been made since the beginning of the century to obtain water from wells, both surface and artesian. Dr. Elwyn Waller informs me that over a thousand exist at present. Within the last ten or fifteen years, very many artesian wells have been sunk by the oil-well methods and the diamond drill. Many of the large breweries, malt houses and manufactories demand an abundant supply of water, and have found it advantageous to sink wells in preference to paying the city water-rate.

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Sometimes they are successful in striking a wet spot and a good supply is obtained, but as there is no certainty from the nature of the formation, they quite as often yield very little. Still, the straitened capacity of reservoirs and the small head allowed consumers have greatly quickened the well industry. They are drilled by the methods perfected in the petroleum districts, and, indeed, one can hardly journey very far around the city without seeing the tall derrick and hearing the creak of the bull wheel and the thud of the drill. The wells are sunk by contract at from $6 to $12 per foot, the contractor fixing his price on his estimate of the hardness of the rock. Much difficulty is experienced on account of this varying hardness, as the drill tends to glance and make a crooked hole. Ordinarily the progress is 20 feet in 24 hours. The drillers say they are obliged to go down from 400 to 1,000 feet to strike water. The following facts have been obtained by inquiring of the drillers, and may not be very exact :

	Feet.	Daily.
Schaefer's brewery	640	5,000 bbls.
63d Street malt-house	414	2,700 "
Third Avenue and 67th Street	1,250	10,000 gals.
Sixth Avenue and 59th Street	730	10,000 "
Field's Building, 1 Broadway	400	57,000 "
Foot 58th Street, Hudson River	700	Unsuccessful,
Municipal Gas Co., 11th and 45th, 2 wells	500 each	30–45,000 gals.
Tenth Avenue and 39th Street	468	40,000 "
West 41st Street, No. 529	585	20,000 "
Foot West 39th Street	550	90,000 "
Sterns, Third Avenue and 42d Street	600	8,000 "
11th Avenue and 48th Street	600	30,000 "

99th Street and Second Avenue, 7 wells, 38 feet each in drift, total of 216,000 gallons per day. — *The Sanitary Plumber.*

Why Building Operations Halted. — Mr. Corliss (the famous engine builder of Providence), not very long before his death, had occasion to build an addition to his manufactory — a big "L," for additional machinery. To prepare the foundation for this L, it was necessary to move a ledge of rock by blasting. The men to do the work on the addition had been employed and put on the payroll; the materials had been purchased and brought to the building, and the work of blasting had begun. The next morning Mr. Corliss passed by the place where work was proceeding, when the foreman in charge knowing his interest in pretty things, called him.

"See here, Mr. Corliss," said he, "here's a bird's nest that we've found, and that's got to go."

He showed the manufacturer a robin sitting upon a nest that had been built, fast and snug, in a crevice of the rock, among some bushes that grew there. The bird flew off her nest as the men came near, and showed five blue eggs that looked as if they had just been laid.

"Can we move that nest somewhere else?" asked Mr. Corliss.

"I'm afraid not, sir. We'd tear it to pieces getting it out, and it isn't at all likely that you could get the bird to go to sitting again anywhere else. We've got to go on, so we may as well rip it out and throw the eggs away."

"No," said Corliss, "we wont disturb her. Let her bring out her brood right there."

"But we'll have to stop the work on the building."

"Let it stop then."

And so orders were given that operations on the addition should be suspended. They were suspended; and the hands stood still, drawing their pay for doing nothing, or next to nothing, while the robin sat on her nest with her air of great consequence and zealous attention to business, and had her food brought by her mate, and at last hatched her brood. And then there were three weeks more to go by, at the least, before the young ones could fly. Corliss visited the nest frequently, not with any uneasiness or impatience to have the robin and the young ones out of the way, but with a genuine interest in their growth. The old birds had all the time they wanted; and when at last they had sternly helped the clumsy, reluctant youngsters over the edge of the nest, and they showed themselves able to get about on their own hook, orders were given to resume the building operations; and the dull boom of the gunpowder tearing the rocks apart was heard where the birds had peeped. — *Boston Transcript.*

Automatic Accident Insurance. — The Employers Liability Company is about to introduce automatic ticket boxes for supplying accident insurance to the multitude. They are on the principle of the automatic weighing machines now so common; drop a nickel into the slot and out pops an accident insurance ticket that insures the holder for twenty-four hours against accidents, in the maximum sum of $500; ten nickels will yield ten tickets, aggregating $5,000 indemnity, which is the limit taken upon any one person. Suppose the chief engineer of a picnic crowd on an excursion barge should load himself up with a lot of these tickets, which are in blank; Some one of the picnickers falls overboard, or shoots out an eye, or breaks a leg; the chief engineer is promptly on hand with his accident tickets, fills in the name of the victim, collects the money from the company and divides with the injured individual or the heirs of the person drowned. Good speculation for the chief engineer. An investment of $1 a day by a speculator in accidents ought to yield "big money" in the course of a season. Possibly the company has surrounded the scheme with safeguards to prevent such speculations, but to "a man up a tree" they would seem to be possible. — *Spectator.*

A Curious Solar Clock. — A prominent watchmaker in Rio Janeiro has a solar clock fitted up in his establishment, which is not only ingenious, but practically solves the question of perpetual motion for those places where the sun shines perpetually. He has an electric bell apparatus in the upper story, and the two wires from the battery are furnished with a thin, flat, horizontal piece of metal, separated by a distance of four or five millimetres one from the other. Just above the flat piece of metal a biconvex lens concentrates the rays of the sun upon them at a certain moment, noon, for instance. The action of the sun's rays heats and bends the metal pieces so that they come in contact, thus closing the electric circuit, which rings the bell. This is not all however, that Mr. Moquin requires of the sun; he forces it to wind up the clock in his own room at the same time. The barrel arbor carries a click and a ratchet, which is wound up by the hammer of the electric bell as it moves backward and forward, striking the hour. And even this is not all, the sun has to regulate the clock also. The canon carries a washer with an indentation corresponding to adjusted lever, which is set in motion by the armature of magnet, and at noon turns the canon so as to bring the minute hand on the figure XII. — *Jewellers' Review.*

The Pilgrim Monument at Plymouth. — The last work on the national monument to the Pilgrims will be the carving of the marble tablet representing the treaty with Massasoit. The Statue of Liberty, and its accompanying panel, the Landing of the Pilgrims, is completed, and four men are busy cutting the Statue of Law. The model in clay of the panel representing the treaty is finished, and a photograph of it has been received by the committee on the monument for their approval. This photograph has been shown to us, and is an exceedingly artistic representation of so interesting an event in Pilgrim history. The scene is laid in the "common house," three sides of which are seen with their well-fitted logs, and the roof covered with thatch. In the middle of the room a common table is placed, at which on the right are seated Governor Carver and William Bradford, behind whom stand Myles Standish and three musketeers, and a drummer and trumpeter, with a drum on the floor. On the left Massasoit and three Indians are seated, with two other Indians and two muskeeters standing behind them. In the rear of the table, between Carver and Massasoit, Squanto is seen in a standing attitude, interpreting to Massasoit and receiving his replies. The grouping of the panel is exceedingly fine, and the faces of both the English and the Indians are drawn with conscientious skill. Mr. Mahoney, the sculptor in both the statues and panels, has shown himself a master of his art. — *Old Colony Memorial.*

TRADE SURVEYS

The last half of the year makes its bow to the commercial and manufacturing world, under conditions which promise a general improvement. The most noticeable features of the past six months have been the steady decline in prices in all channels of trade and industry, the declining volume of business, the increasing abundance of money, the declining activity in railway-construction and unfavorable balance of foreign trade. These influences have not been productive of any decided harm thus far, but they warn the producing interests generally that they must avoid any overproduction, and preserve harmony between production and distribution. In a general way, this is done; scarcely any mistakes have been made. Those controlling money have been very conservative, farseeing and prudent; if any mistakes have been made, they have been on the side of a too great conservatism. The financial management in business affairs have been far above that of recent years; greater prudence has been observed in all directions, from railway management down to the conduct of individual affairs. A goodly number of firms and corporations have started into business during the past six months, but they start well equipped with capital and experience, and so far as their operations have gone, they have been characterized by good sense, and a clear comprehension of business needs. Everything that has been done in the great industries, has been done wisely. A sort of expansion has been going on all the time in capital, and in facilities for cheaper production; but when it is looked into, such expansion is found to be in right directions. The cost of production has been declining, not only through competition, but through more effective and economic means and methods. The declining tendency, so far as it has been due to competition, is being gradually brought under control. Railroad rates are steadily declining. Competition is still very active in railway circles, from Maine to Texas. There are rumors of railway wars, but it is not necessary that the conflict between railroad systems should assume the magnitude of wars, in order to be productive of good. There is nothing that is likely to obstruct this contest; and in the long run, it will be productive of good, not only to shippers and the public at large, but to railway properties themselves. It is not likely that much new construction will be undertaken this year, although there is an abundance of capital awaiting a favorable opportunity to inaugurate very extensive enterprises, not only for traffic, but for the development of territory to be penetrated. In fact, this is one of the important points that will direct and control railway-constrnction for the next few years. The improvement of property will constitute the strongest inducement for construction. There are some 2,000 miles of railroad now projected in the West and Southwest, the construction of which will be pushed with a view, primarily, to the sale of land to be irrigated, mines to be developed and agricultural regions to be brought within reach of the husbandman. It is useless for writers with dropping spirits to say that railway-building has reached its limit for years to come, and that when it revives it will be within very narrow limits. There are grander opportunities now, than ever before for railway-building enterprise; capital and enterprise appreciate this, and will act upon it in the near future. Advices from a number of our leading builders and architects throughout the West, do not altogether harmonize as to the building probabilities for the coming six months. In three or four of the larger cities, the reports are not of an encouraging character; but from a number of smaller cities and towns, a better condition of things is reported. The industries are rearranging themselves; and in this rearrangement a good deal of work is being developed. It is safe to say, as it has been repeatedly stated, that house-building will be actively prosecuted in all sections of the country. The iron-makers' conflict in Western Pennsylvania will not likely be prolonged. The employers are very anxious to rid themselves of the iron grip of the Amalgamated Association, but can hardly do so. Builders will continue to pay existing rates of wages, to the close of the season. Wages generally will not be seriously disturbed in skilled directions; common labor has declined ten per cent within thirty days. The tariff agitation promises to be the great issue between the two parties; but it is one which is scarcely sincere. Rednctions are certain to be made, no matter which party secures control of the Government. Public opinion seems to be decidedly in favor of them, and the best interests of all concerned will likely be subserved by advancing as gently as possible in the direction of lower duties, so as not to interfere with a healthy industrial activity.

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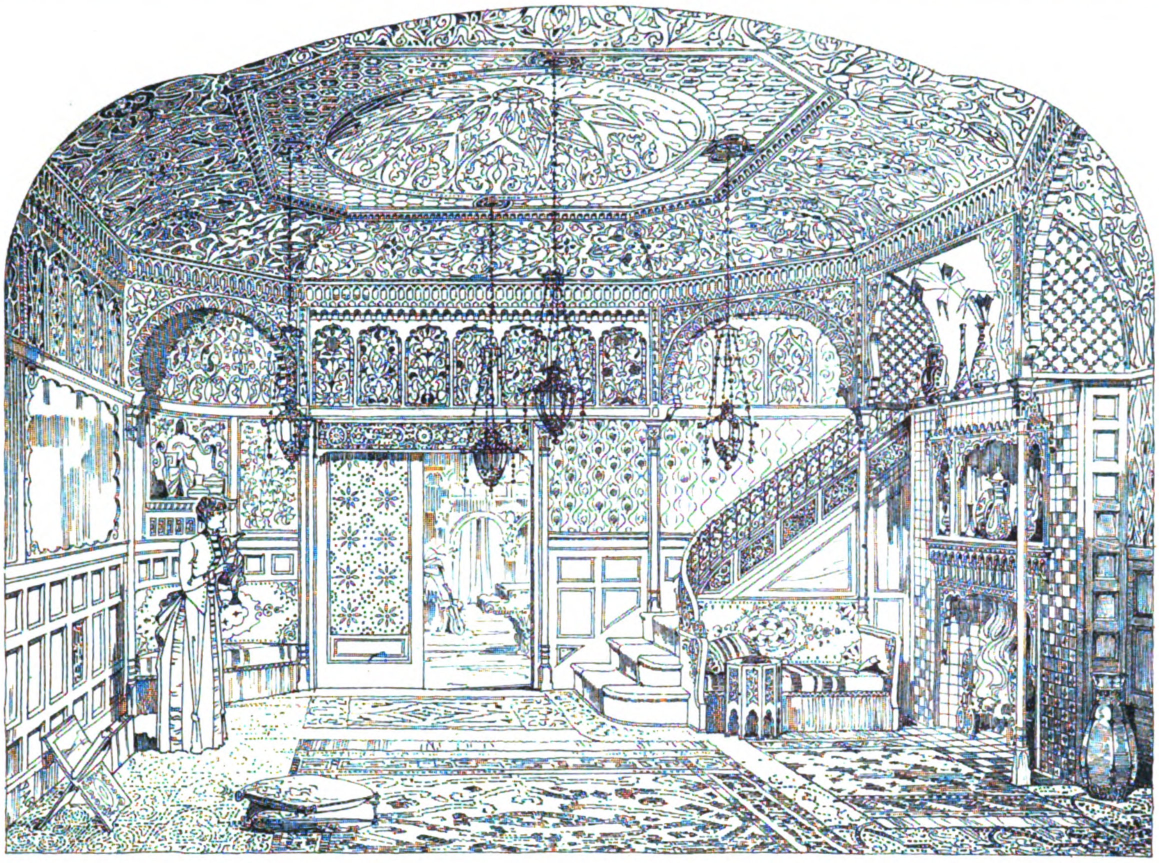

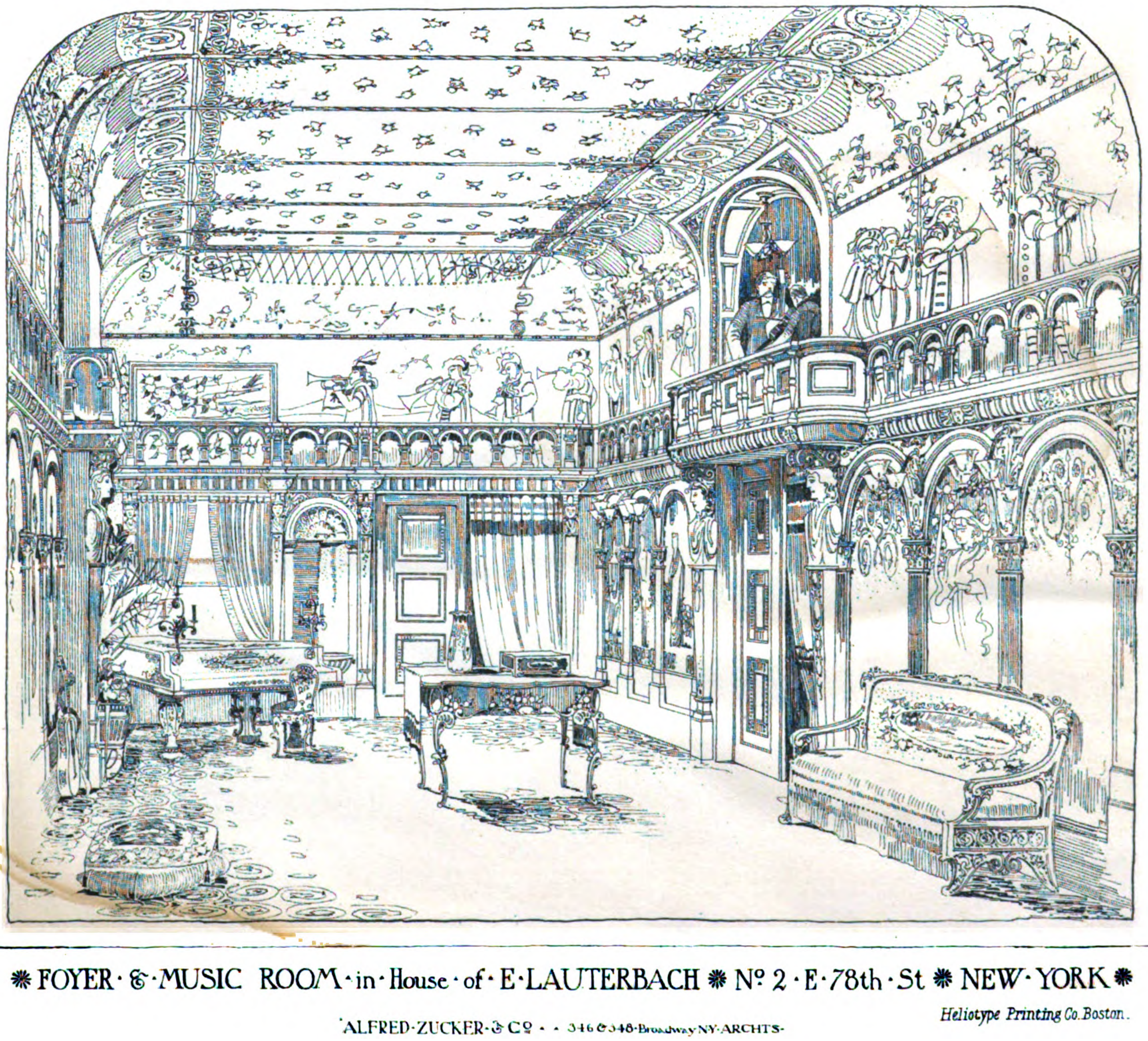

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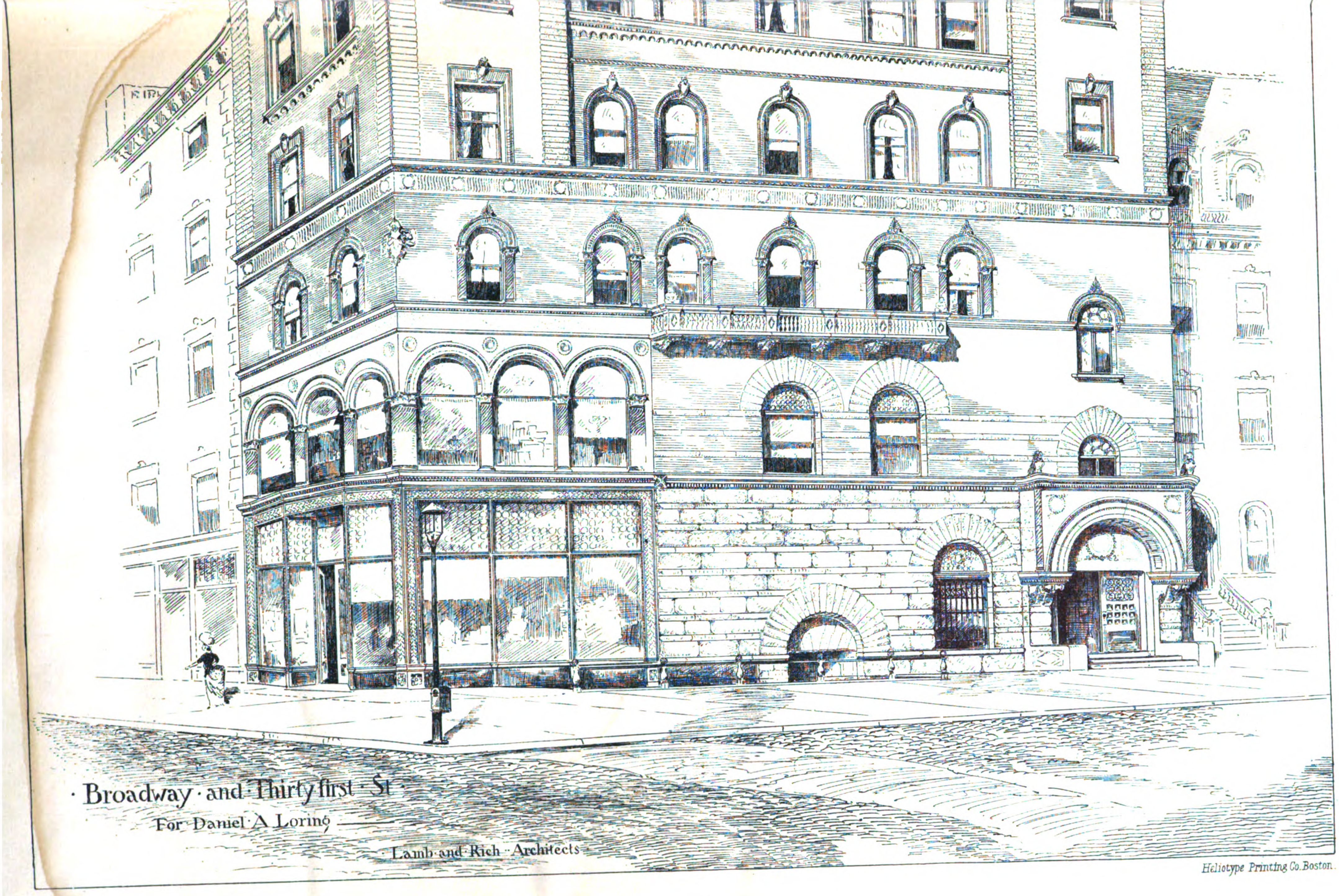

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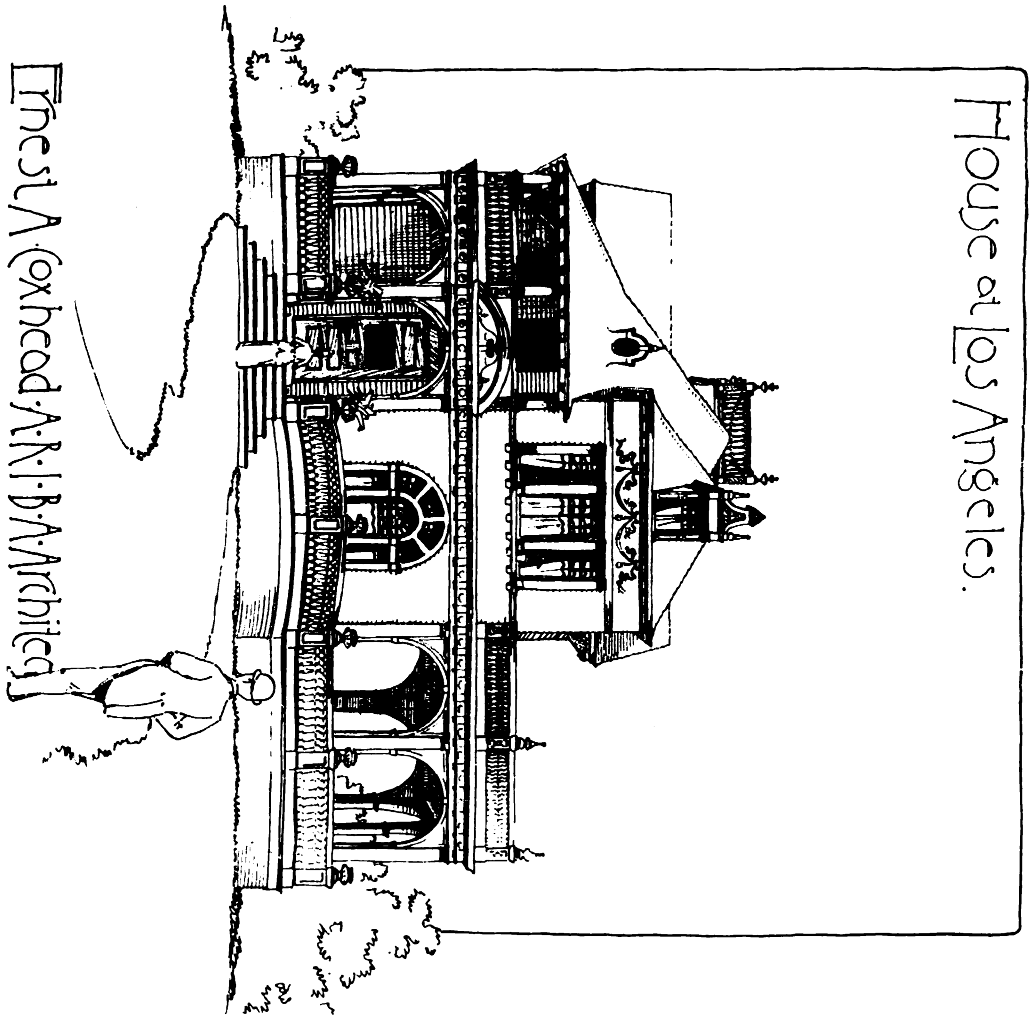

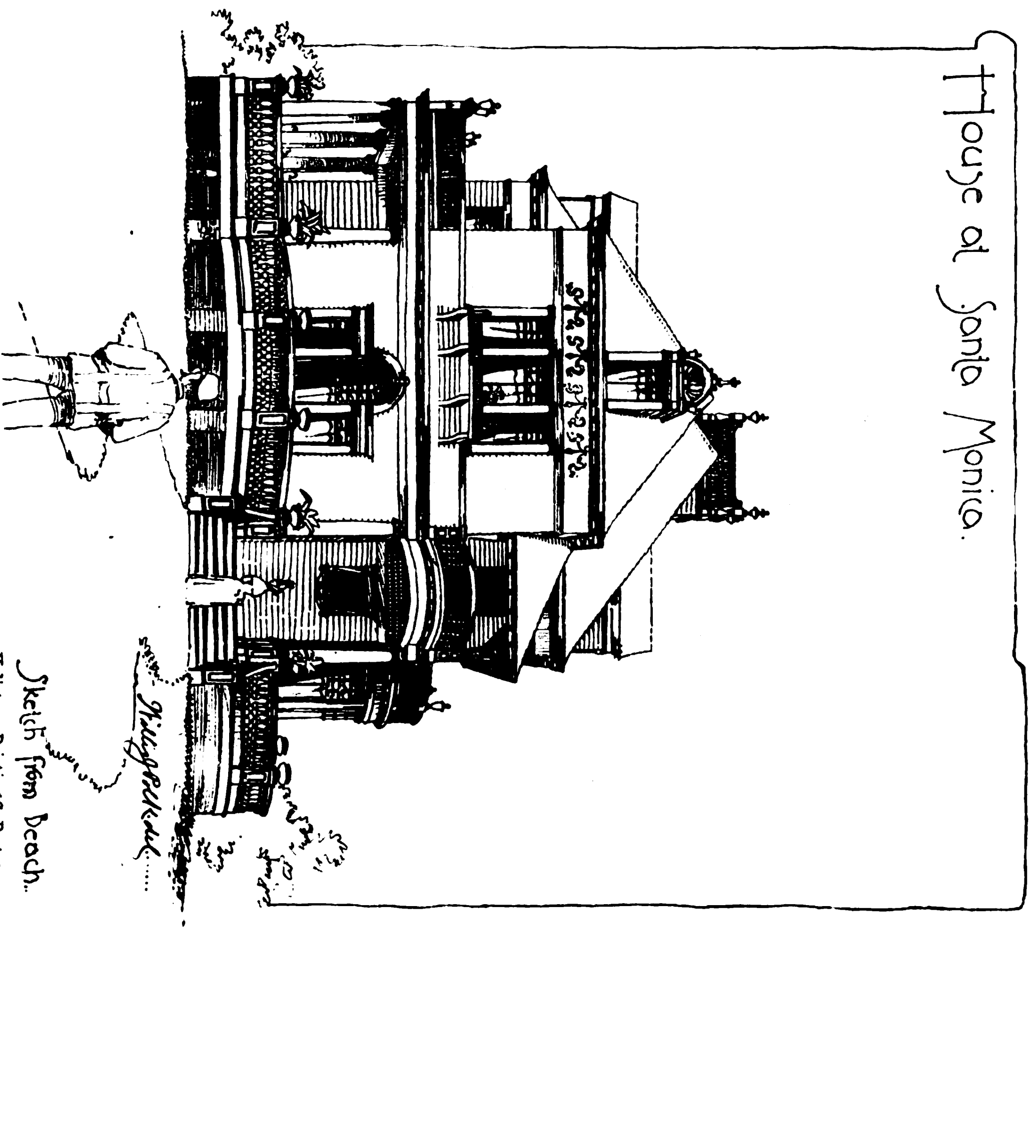

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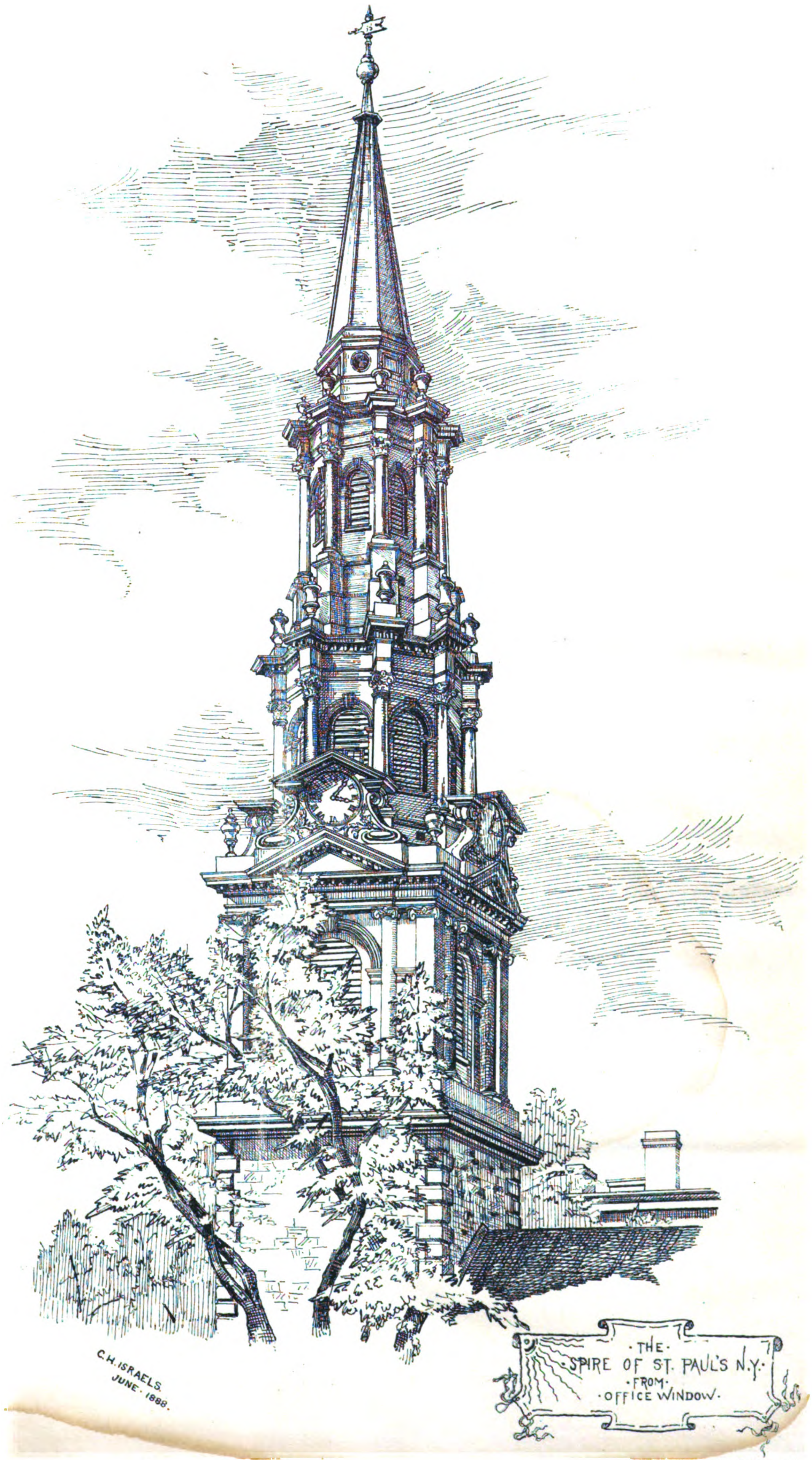

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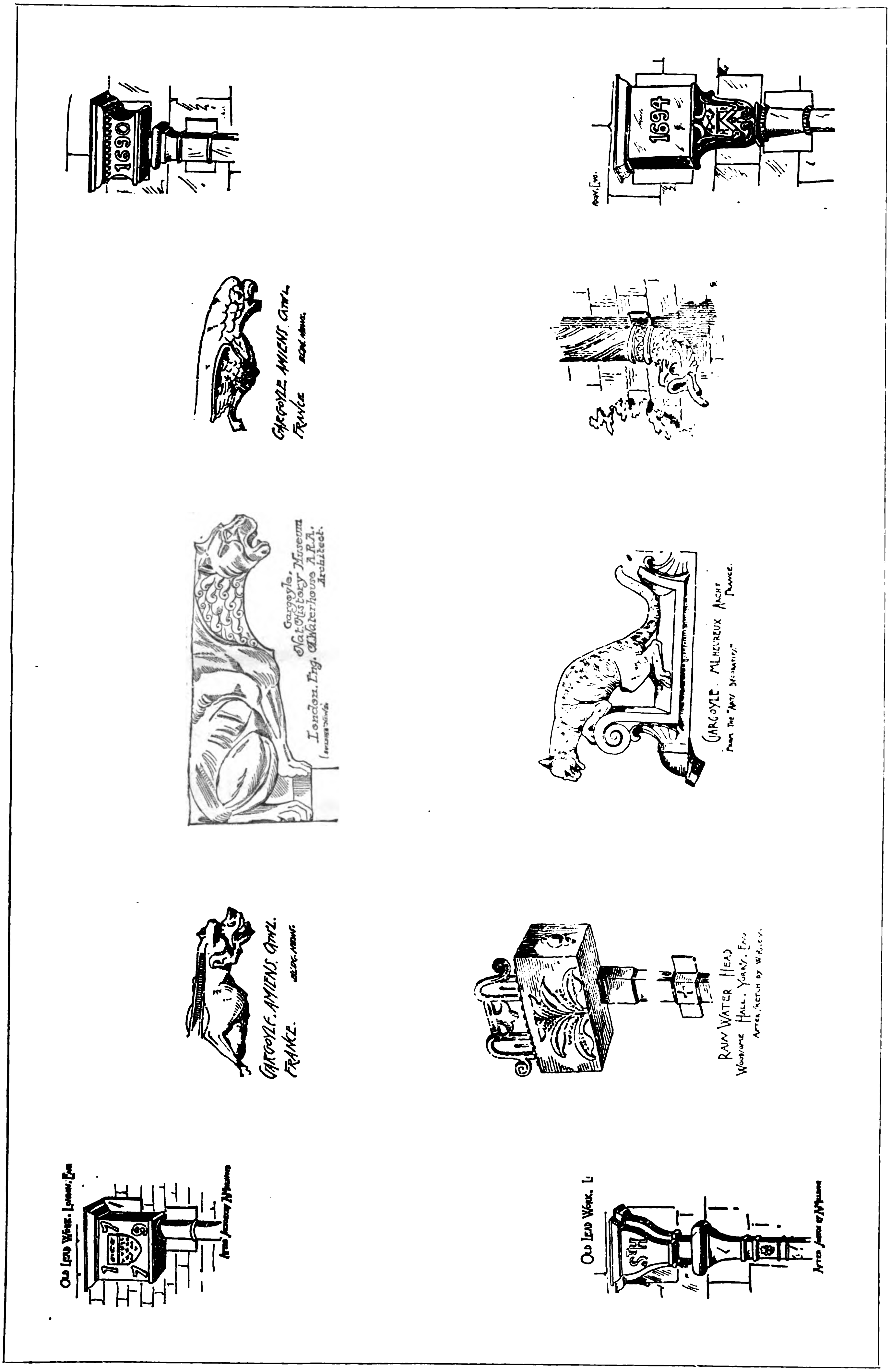

GARGOYLES AND SPOUT-HEADS.

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JULY 14, 1888.

Entered at the Post-Office at Boston as second-class matter.

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WE have this week to record the deaths of two architects, one belonging to the younger generation, while the other was perhaps the oldest practitioner in the country. The younger man, who died in the latter part of last month, was Mr. Henry Parfitt, of Brooklyn, N. Y. Mr. Parfitt was an Englishman, one of three brothers, who came to this country about fifteen years ago, and by their talent and careful administration of their business built up a large practice. Mr. Henry Parfitt was at first the designer of the firm, but on the arrival from England of his younger brother this part of the work was shared between them, and to the skill of one or both the brothers Brooklyn owes a considerable number of its finest buildings. For some reason, the practice of architecture seems to be particularly trying to young men, and an unusually large proportion of members of our profession succumb to the toil and anxiety through which they must gain a foothold in the world; and like so many others, Mr. Parfitt, just as his position and reputation had become firmly established, fell a victim to the attack of organic disease, which his brave resistance could not overcome. The older architect of whose death we have to speak was the venerable Jonathan Preston, of Boston, who died recently in that city, at the age of nearly eighty-seven years. Mr. Preston was born in Beverly, in 1801, and practised his profession in Boston for more than half a century, erecting many of the principal buildings of the period preceding the great fire. For the last fifteen years or so he had been out of active practice, but until within a short time he retained his desk in the business quarter of the city, and was constantly consulted on building matters by his old friends, as well as by official persons. His most successful work in Boston is, perhaps, the pair of buildings erected for the Boston Society of Natural History and the Massachusetts Institute of Technology, which are treated in the classic style considered proper for such buildings at the time they were designed, but show dignity and elegance of proportion, with an effectiveness not often combined with classic design. As a citizen Mr. Preston was greatly esteemed for his energy as well as his perfect integrity, and was many times elected to municipal and State offices.

ANOTHER recent death of importance is that of Mr. James Jackson Jarves, which occurred at Tarasp, in Switzerland, last week. Mr. Jarves was born in Boston, in 1818, and always retained a strong affection for the home of his youth, although ill health compelled him to live away from it for fifty years. His first foreign residence was in the Sandwich Islands, where he lived ten years, occupying himself by publishing and editing a newspaper, which acquired great influence in the country. Soon after his return to the United States, in 1849, he received a signal proof of the appreciation which his work had gained for him with the Hawaiian Government by an appointment as Commissioner from the King of Hawaii to the Governments of the United States, France and Great Britain, with power to negotiate treaties with all those powers. His duties as the holder of this appointment took him to Europe, where he found so much to interest him that most of the remainder of his life was spent there. Like a true American, however, he viewed the life which surrounded him rather as an object to be studied by the light of the maxims in which he had been trained than as something by which those maxims could be superseded; and his two books, "*Parisian Sights and French Principles,*" and "*Italian Sights and Papal Principles, seen through American Spectacles,*" are particularly pleasant reading on this account. On taking up his residence in Italy in 1852 or 1853, he became, like most amateurs of that time, an enthusiastic collector of the works of art of various kinds then so abundant there. With the help of assiduous study of the best examples, and untiring industry in searching for authentic, but little-known specimens, he succeeded in forming a most beautiful and interesting collection of works by the old masters, including a series of pre-Raphaelite paintings which would do credit to many a pretentious foreign museum. Not being rich enough to keep the collection for himself, it was sold here, and unfortunately scattered, the larger portion of the pictures, however, falling into the hands of the authorities of Yale College, who made of them the nucleus of the celebrated collection now belonging to the college. Continuing his researches, he added to his treasures specimens of antique sculpture and examples of the minor arts, which from time to time have found their way here, among the most noted being the beautiful Etruscan sarcophagi now in the Museum of Fine Arts in Boston, the collection of Venetian glass presented by him to the Metropolitan Museum in New York, and a part of the Hollenden collection of pictures and sculptures at Cleveland. As a critic, Mr. Jarves was intelligent and zealous, but critics of art have but a thankless office in this country, and he will be remembered longest for his clever and earnest books of travel, and for the inestimable service which he has rendered his native country in collecting for it treasures, while the opportunity remained, whose value will be every year better understood.

A GREAT lockout has just occurred in the iron mills, and about one hundred thousand men are out of employment. According to the newspapers, the lockout seems to have been a concerted plan of the employers' association, and to have been purposely arranged to take the men by surprise. At a certain time in each year, it has been customary for the representatives of the masters and men to meet and agree upon a scale of prices for the year. This season, as we understand it, the scale of last year was again presented by the men, who were astonished at being told that it was rejected, and that a scale had been prepared by the manufacturers, which must be the basis of negotiations. The men, who seem to have behaved very quietly and well, took the manufacturers' scale into consideration, and after a few days' deliberation decided not to sign it. The manufacturers then informed them that if it was not signed within three days, all the mills of the association would shut down; and at the appointed time, neither side having shown any disposition to alter its mind, the mill doors were locked. Since then, individual advances have been made on both sides, and will, we trust, continue until business is generally resumed. We cannot consider that the attitude of the masters is particularly creditable. If one of their influential customers should walk into their office, ask the price of iron, and, on being informed, offer them a price ten per cent lower, and then stalk out again, remarking that unless his offer was accepted within three days he would have their business destroyed, and themselves and their families turned penniless into the streets, they would probably consider themselves very harshly treated; yet this is exactly the way in which they are treating their men. It is certainly the prerogative of the man who has anything to sell to say first what price he asks for it. If his customer does not wish to pay so much, he says so, and the seller then decides whether he will make any reduction. To call the men's action a manifestation of "dictation" on the part of the persons who have their year's labor to sell, and to refuse to listen to any compromise, seems to us like an attempt to get up a silly quarrel about nothing, and we should not be sorry to see the manufacturers defeated year after year, until they can use the great power of their association with moderation and common-sense, instead of flying off into violent — we might almost say murderous demonstrations at every fancied slight to their dignity. Fortunately, many individual masters and crews of workmen have quietly settled the matter between themselves, and we

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hope that others will follow. In some cases the manufacturers have signed the old scale for another year; in others the men have accepted a reduction; and the largest firm in Pittsburg, that of Oliver Brothers and Phillips, which employed more than three thousand men, has agreed upon a compromise, each side making some concessions. It is probable that similar concessions would have been accepted by the conference, and the whole trouble averted, if any one had ventured to propose them.

THE Prince Consort of England once said, "If you send for an architect to undertake some unusual work, he debates, hesitates, trifles; if you send for an engineer, he does it." On this text the *British Architect* founds an excellent little sermon on the value to architects of extensive and varied capacity. It is perhaps the misfortune of the profession that its members must be at once artists, business men, and scientific experts, and that they cannot choose to be either more than the others without great injury to their usefulness and success. There is a common notion among architectural assistants, that to be an artist is a much superior thing to being a good business man, or a skilful constructor; and that it is beyond human capacity to excel in design and in anything else at the same time. The conclusion which they draw from this convenient theory is that if they can learn to make picturesque designs and show them by taking sketches, they need waste no time in studying the dry details of quantities and prices, or in compelling their brains to grapple with mathematical problems; and, as a consequence, they degenerate into mere clever draughtsmen, drifting, usually at a good salary, from office to office, but becoming constantly less and less fitted to practice successfully on their own account. The man who would avoid this tendency should never forget, in the pleasure which he takes in exercising a well-earned facility in design, the importance of making constant efforts to keep himself familiar with details of construction, prices and specifications. Let him imagine himself a young lawyer or merchant, with a limited income, and a family dependent upon him, who has laid by money enough to build himself a house, and then reflect whether he would be likely to apply for designs and supervision to the dashing A, whose captivating sketches, made off-hand with a burnt match, are hardly more the talk of the clubs than his reckless Bohemianism and financial incapacity, or to the industrious, sober, and well-trained B, whose sketches have the advantage over A's of looking something like the buildings constructed from them, and who is known to respect conscientiously his employer's wishes in regard to expense. The young architect must bear in mind that his first clients will generally be his personal friends, poor but hopeful, like himself, and that defective specifications, or ignorant supervision, or impossible plans, may bring debt and bitter disappointment to them, and to him an unfavorable reputation from which he will suffer through his whole professional life. There is nothing so very difficult about any of the circle of sciences which constitute the architect's equipment. The *British Architect* tells of a distinguished architect and masterly designer, who, probably through injudicious training, or mischievous associations during his life as a draughtsman, began his career with an unconcealed loathing for what he called the "office pettifoggery" of specifications, supervision, quantities and estimates. He was intelligent enough, however, to see the necessity of conquering these, and devoted himself to the task, until he became as thorough an adept in these as in the artistic details of his work, and now, as the *British Architect* says, "his bills of extras are magnificently short; he is ready for grappling with every contingency which ever arises, big or small; and, mightiest of all proofs of an architect's success, his clients come to him a second time."

THE *Providence Journal* publishes an article in regard to the action of the House of Representatives about the Congressional Library, which condenses into a small compass the facts in regard to the abuses which have been going on in connection with it. As those who read the newspapers know, the work on the library has been carried on, like that on most other public buildings, by a huge corps of salaried officials. Instead of compensating the architect by a percentage on the cost, as is done in all other civilized countries, or, let us say, in all countries where skill and talent are considered to be worth paying for, the ignorant penuriousness of the Government, fearful of offering anything like encouragement to the "aristocracy of edication," about which we have known a voter complain, confers upon the architect of its principal building a salary about equal to that of a senator's cook, and congratulates itself upon the business talent which can secure the best architect applying for the commission at about one-tenth the compensation which private individuals would pay him for the same work and responsibility. Extending this wise system still further, all the persons who, in the opinion of the Government, will be needed to provide for the due designing and supervision, as well as the construction of the building, are retained at salaries usually inversely proportioned to the value of their services. The Government being perfectly ignorant of the size and character of the force of assistants employed by an architect, or needed for carrying out construction, and unwilling to follow the custom of private persons and other official bodies, by giving its architect a proper compensation, and allowing him to choose and pay his own assistants, seems to have added to the architectural corps of the library any one who wanted a place of some sort, and had influential support, and we find, besides the architect-in-chief, an "assistant architect," an "expert in heating and ventilating," an "expert in iron construction," an "accountant," a "computer," four draughtsmen, and other aids to the architect in the fulfilment of his duties; while, as general attachés to the work of construction are, or have been, employed a foreman, assistant foreman, time-keeper, inspector of drainage, carpenters, and water-boys, besides five men and four women who draw salaries as persons "in charge of horses and carts." It is impossible to suspect the Government Commissioners of any unfaithfulness to their charge; on the contrary, it seems to have been rather their excess of zeal in making all appointments themselves, without any comprehension of what was really needed, yet without being willing to trust any one's knowledge as being greater than their own, which has, as the official report informs us, led to the expenditure of nearly eighty-two thousand dollars in salaries in two years, besides an additional sum for wages of laborers, which brings the total up to about one hundred thousand dollars, with the net result of digging a large hole in the ground, and building a board fence around it. The *Providence Journal* says that "the House has not put a check to this sort of business a moment too soon." We trust that its action may result in "checking" "this sort of business," which has been going on throughout the whole field of Government work for many years, but, so far as we can see, and as experience indicates, it seems to be simply intended to turn out indignantly one set of salaried superfluities, and put in another, to be in turn unscrupulously ejected later; and, in our opinion, if the people of the country wish to see the public building business relieved of the huge burden of salaried hangers-on, of inspectors who do not inspect, deputy inspectors to watch the others, "experts," "computers," and so on, it must consult, not with Congressmen who have constituents to please with places, but with the citizens who have spent their lives in learning how to conduct building operations properly and economically, and have a right to be allowed to serve the public on the same terms, and under the same responsibility, as their private clients. There is not a single argument, so far as we can see, to be urged in favor of the present system of Government building. With respect to the architectural work upon them, which is the most important part, it simply secures very imperfect service at a very high price. To take the case of the Congressional Library, the architect-in-chief, at a salary of four thousand dollars a year, is "assisted" by a large number of independent officials, and has his office rent, and the cost of keeping a carriage, paid out of the Treasury, at an expense, probably, of at least twenty-five thousand dollars more, making twenty-nine or thirty thousand dollars a year expended upon the architect's office, but not on him. If he were paid by commission in the usual way, his annual fees, averaged over the period which would generally be consumed in erecting such a building, would be much less than this, and he would not only pay his own office rent, coachman's wages, and salaries of draughtsmen, "computers," and "experts," but would be much better served by them, and would make a decent income out of what was left. This example is one of many, and, as has been often shown, the country, instead of spending enormous sums in having inferior men, at meagre wages, design mean and ugly buildings for it, may, if it chooses to insist upon it, have, at a less price, all its public work the best and most beautiful that the ablest architect can produce. If it wishes to bring about this change, the present occasion would be a favorable one for making its desire known.

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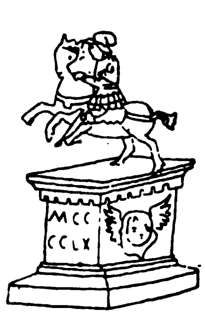
THE HORSE IN SCULPTURE.[1]



An old Florentine Sketch.

NEXT to man, the horse has been the most frequent subject in sculpture, perhaps it may be said in all arts, but in sculpture more especially, as the horse is the moving pedestal for the man, on which he may be seen to as great advantage perhaps as on his own feet. To "witch the world with noble horsemanship" has been a favorite delight with the young, the active, and the fearless in all times and places when equitation was possible, and some tribes and nations, not only in the old world but also in the new, may be said almost to live on horseback. I am not aware whether the evolution theorists have attempted to indicate the time when horse and man first became acquainted, but assuredly it appears to have been prehistoric. The horse must have been the man's first friend, we must think. The dog may have come next, who is superior in intellect to the larger animal, but is not so directly useful. The astride position of a well-made man exactly fits on a well-made horse, just as if they were adjusted for each other. And no doubt so they were, for such a perfect coincidence of relative forms could not have taken place fortuitously. We need not marvel therefore at the frequent association of them in art, more especially in sculpture, an art which is so peculiarly and specifically that of form. The first mention of this noble quadruped, who lends the speed and strength of his four legs to man who has but two, which occurs in the Holy Scriptures, speaks of him as already in habitual use for riding by the human race. "Dan shall be a serpent by the way, an adder in the path, that biteth the horse heels, so that his rider shall fall backward." — Genesis 49 : 17. The second notice is in Exodus 15 : 21. "The horse and his rider hath he thrown into the sea." And here again they are associated as the lord and the minion, the master and his servant.

With the exception however of these two passages, there is not much mention of horses before the time of Solomon, who, notwithstanding this, had an extensive stud of them. He had forty thousand stalls of horses for his chariots, and twelve thousand horsemen distributed in his fortified places; but it appears that he had his horses from Egypt, as the King of the Hebrews seems to have been forbidden to breed them. Before this, however, David, having won a great battle over Hadadezer, King of Zobar, took seventeen hundred horses, and had all of them belonging to the chariots of war lamed, reserving only sufficient for a hundred chariots. The passage in the 39th chapter of Job, verses from 19 to 25, descriptive of the war-horse, is so fine, that, although well-known, the introduction of it may be pardonable, as affording an epic glorification of the creature. "Hast thou given the horse strength? Hast thou clothed his neck with thunder? Canst thou make him afraid as a grasshopper? The glory of his nostrils is terrible. He paweth in the valley, and rejoiceth in his strength: he goeth on to meet the armed men. He mocketh at fear, and is not affrighted; neither turneth he back from the sword. The quiver rattleth against him, the glittering spear and the shield. He swalloweth the ground with fierceness and rage: neither believeth he that it is the sound of the trumpet. He saith among the trumpets, Ha, Ha; and he smelleth the battle afar off, the thunder of the captains and the shouting." What a grand image of a horse this presents! of a charger trained by man to bear him into the fight, with perhaps an *arrière pensée* on the part of the rider of his being able to take advantage of his superior fleetness to carry him out of it, in the event of defeat. But nought of this discretion exists in this courser of Job's, his only inspirations are advance and triumph. The force and fierceness of a horse when thoroughly awakened are well-known, and the onslaught of a lion or a bear on him has been known to be concluded by the jaw of the assailant being broken by the horse's violent hind-hoofs. Might not such a courser as this of the Book of the Patriarch of Uz form a fine subject for a painter or a sculptor?

From this steed of Holy Writ we may turn to him of Classic story, Pegasus, who was so fleet that he was fabled to have wings, the famous Greek prototype of the "Flying Childers" of the English turf. What a career he had and what a record of actions in which he took part! He was born according to Hesiod, near "the source of the ocean," wherever that may have been. He was broken in by Neptune, and put through his paces by Minerva. He was lent to Bellerophon to conquer the Chimæra, and also to Perseus to vanquish the sea-monster who was about to devour Andromeda. He was a fortunate horse in every respect, and was a favorite with the Muses on Parnassus, where no doubt he was well stalled on the mountain top; and he repaid his keep and entertainment when staying on the neighboring height of Helicon, another country-seat of the divine Nine, by striking the rock with his foot, and raising the perennial fountain of Hippocrene, thus named after him, the Horse-fountain, which has been the spring of poetry ever since. Well worthy therefore does he appear to be of his annals in the pages of literature. He does not, however, seem to have been frequently a subject of Art; the reason for which probably may be that he is more fitted for depiction by himself, than with a rider on him who would be apt to be concealed by his wings rising from his shoulders, a matter which would not trouble the poet, and thus Ovid and others have made good use of him as a courser for their heroes. However, by himself, as a wild steed, his idea presents a very superior image, and in sculpture, stamping his foot on the ground, might form a classic and appropriate emblem and embellishment for the springing forth of a stream or fountain in some ornamental grounds where fancy is the leading feature. On the whole, perhaps, he is the most celebrated horse on record, his wings being, of course, only a mythical addition to indicate his swiftness.

There are, however, in ancient story many other mentions of famous horses, among whom not the least renowned was the favorite charger of Alexander, who was named Bucephalus from his head being somewhat short and thick, like that of a bull. He was refractory and untameable in the hands of others, but so meek and subservient to his master that it is said that he used to kneel down for him to mount. He bore him in various of his battles in Asia, in one of which he met his death at the advanced age, for a horse, of thirty years. As a token of regard, and in gratitude for his services, the great Macedonian built over his remains a city in India near the Hydaspes, which he called after him Bucephala. In India there have been also several other memorials in the way of records and tombs erected by the great people and invaders of that country over the remains of favorite steeds that had carried them, some of which are still in existence. Doubtless, however, from their eminent use in war, the Macedonian regal hero was the most remarkable for his estimation of horses and of their images in sculpture, as in respect of the twenty-five statues which he caused to be made of his chief officers, under the superintendence of his favorite sculptor Lysippus. They were all equestrian, but alas not one of them is in existence.

If we may judge by the remains of horses that we have in the Parthenaic sculptures which were executed about a hundred years previously, we have reason to suppose that those of Lysippus were very fine, for he was an admirable sculptor, especially in respect to the grace of proportion with which he endowed his works. The most perfect examples in Greek art which we now possess are in the cavalcade of the frieze of the Parthenon in the British Museum. They represent a small breed compared with our present English charger, and have their manes hogged, but they are admirable in the justness of their anatomy and their beauty of form. The sculptors of these did not stray into the anomalies of structure which are to be seen in some of the horses of mediæval art. To what degree the ancient Greeks studied anatomy by means of actual dissection seems to be a doubtful point, and it has been suggested that a great prejudice existed against it with regard to the human race, which, however, could not have applied to animal forms. However this may have been, the anatomical justice and precision of the Phidian School, displayed in their sculptures both of men and horses, is remarkable. The structure of their horses is as perfect as that of their human beings.

In later mediæval times, judging from various of the representations of horses of that period, comparative anatomy was not so well comprehended as it is now; a relic of which may be recognized in our present name for the knee of the horse, which in relation to, and in consonance with the anatomy of man, would be called the wrist, it being in the fore-quarter, and formed of a closely compacted company of bones like the wrists of our own arm; while in like manner the true knee-joint of the horse is the stifle-joint of the hind leg, where the true knee-cap, or patella, exists, which in oxen is called by butchers in England the cramp-bone. This relation and similarity of bony structure between the man and the horse, which indeed pervades in degree that of all vertebrated animals may be further illustrated by causing the skeleton of a horse to be placed erect on his hind legs by the side of that of a man, or, on the other hand, the skeleton of a man on all fours, resting on the tips of its toes and fingers, beside that of a horse in his usual standing position, when the identity of the relative general principle of structure is exemplified at once. There is nothing in the least new in this statement of fact, although uninstructed people are apt to overlook it. Several of the mediæval artists appear also to have overlooked it. The ancient Greeks, however, were keener-sighted and more logical. There is no such discrepancy or short-coming in their representations. They appear to have at once discerned that the true theory of structure of form in a horse was, at least in its principal facts, closely analogous to that of man, and the only shade of novelty that I would venture to submit as such, is the probable reason why they so readily arrived at this conclusion.

The Greeks, as we know, regarded the human form as the most perfect thing in nature, and so far as they could under that image represented everything about them, and portrayed even their mountains, woods and rivers under the likeness of human beings. They incarnated even the powers of air, sea and infernal regions under the semblance of man, and under the same influence of thus looking on his form as the acme of nature, they were led to seek for the same theory of structure as his, in whatever animal they undertook to represent. Sentiment is apt to mislead people, but in this case it conducted them to a logical fact, and shielded them from errors into which some other artists have fallen. The perfection of the horses in the Parthenaic frieze is an evidence of the comprehension of the true theory of their structure. Whether their being somewhat small arose from the breed then in use being so, or from the artistic purposes of their position and relative composition, may

[1] A paper, by an English sculptor, introductory to the papers on "Equestrian Monuments."

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not perhaps be definitively determined. At all events they are excellent in form and action. We possess, unfortunately, no horses of this period as statues, or in the round, for the ancient horses on the Monte Cavallo do not appear to have an undoubted pedigree. And in this respect we have but the horse's heads from the tympanum of the same temple to supplement the forms presented in the frieze, to indicate the sculptural type of the horse of that time adopted by the Greeks. It is scarcely probable, however, that they had but one type, as they so distinctly varied the characters of their statues of human form — as in their representations of Jupiter, Apollo, Hercules and Bacchus. Probably, however, the breeds were not so distinct as at the present time when the needs of varied civilization have diversified them so much, as in the hunter, the race-horse, the dray-horse and the Shetland pony. The war-charger was no doubt their most favored exemplar, as in the case of the twenty-five equestrian statues made for Alexander.

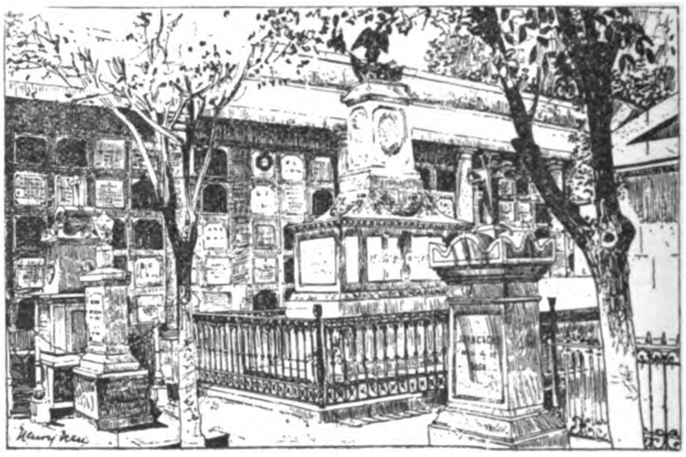
The sculptor of these, Lysippus, was famed for the elegance of his works and a saying of his is recorded, that he sought to represent man, not as he is, but as he should be. Thus, we may infer that he sought a similar quality in his horses, and the coincidence of their theory of structure having been fully recognized long before his time, he may be assumed to have gained grace in the horse by means analogous to those by which he had been successful in man.

The Greek sculptors all made the heads of their statues somewhat smaller in reference to the rest of the figure than is found in real nature, especially in respect to the features, and this proportion has been accepted ever since as being essential to beauty in a statue. If he adopted a corresponding treatment in his horses, Arabia was not so far off but that he may have readily obtained his type from thence. In the Arab horse, although the brow is broad and ample, the muzzle is small and delicate, which adds eminently to the beauty of the creature. And further may be submitted the question, what is the good of a great head to a horse? It requires a stronger and thicker neck to support it, and this large head and neck is so much the more for the fore-quarters to sustain. On the other hand, if the head be light, the crest may continue high and well set back, but the neck may also be light and somewhat thin across, with advantage. When the horse has a rider on him, as in an equestrian statue, in the front view the horse's head is nearer to the spectator than that of the rider, and is thus the more apt to interfere with it, if it be large. Thus a degree of comparative lightness in these parts not only conduces to the grace of the horse, but also to the satisfactory effect of an equestrian statue.

In a man a wide wrist is an essential factor of strength, and so also it is in the horse in the corresponding joint, which we call the knee. In both cases it should be wide and flat, so as to gift it with endurance as well as force, as also it is the joint at which the horse usually first breaks down. In respect to the barrel, it should be wide and ample, with the withers well set back, and the shoulders sloping, and the chest deep if not wide, so as to afford ample room for the lungs of the horse; which are large, and take in some eight or ten times as much air as those of a man, and therefore, also, although the muzzle may be delicate the nostrils which greatly supply and free them in inhalation and expiration should be large and ample. In these short notes every point of the horse cannot be touched on, and therefore I would conclude them by only a general remark in respect to the hind-quarters, which should be strong, and long, so as to be well bent without raising the rear too high, and not straight-up-and-down as in some ponies, as it must be held in mind that it is from the hind-quarters that nearly all the propulsive force of the animal is derived, which the front legs comparatively only regulate. The above considerations are some of those which attach to the sculptor's art in the representation of a horse, separate and apart by himself, or when he becomes the pedestal of a hero in an equestrian statue. J. B.

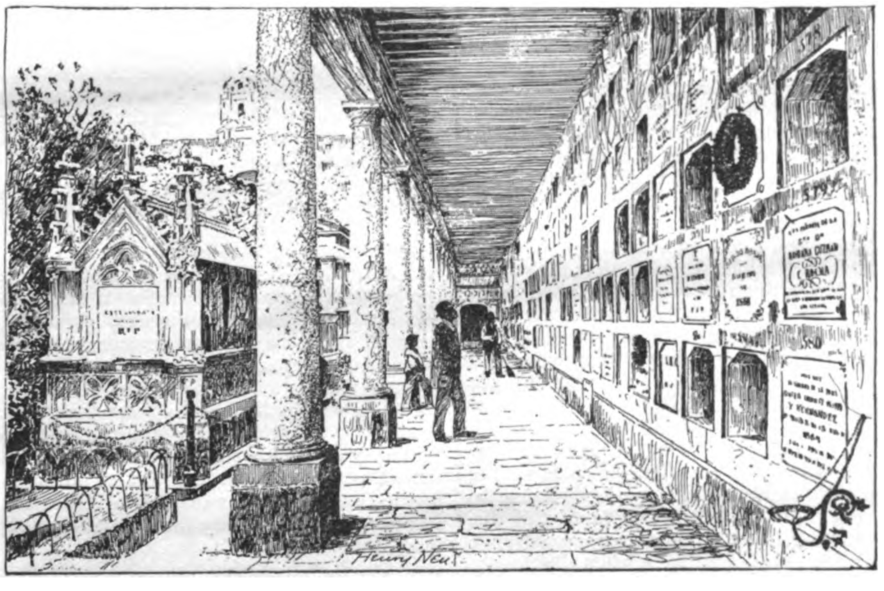
When is a Church a Church? — Bishop Loughlin of Brooklyn has begun a suit in the Brooklyn City Court to restrain the city from collecting $600, levied upon the property of the Church of St. Augustine, in Sixth Avenue, now in course of construction. The Bishop claims that it is already entitled to exemption from taxation under the church clause. The city authorities claim that it is not exempt until the edifice has been completed.— *N. Y. Commercial Advertiser.*

MEXICAN BURIAL PLACES.



Tomb of President Comonfort in the Panteon de San Fernando, Mexico.

In connection with the attention which the *American Architect* is giving this year to American monuments, and the marked and unmarked burial places of some of the heroes of American history, a brief paper upon Mexican burying-grounds may be interesting to the reader. It cannot be claimed, however, that most of the cities of the dead scattered throughout the sister republic would be found fruitful in suggestions to the architect, or to those having the care of cemeteries in our country, save in one respect, that is "how *not* to do it." One of the things to shock the visitor in Mexico is the prevalence of customs regarding the disposal of the dead, totally at variance with what one would expect to find in a Roman Catholic country, differing widely from the customs of the United States, and by no means comparing favorably with the latter.



Panteon de San Fernando, Mexico.

During my sojourn in Mexico I was greatly surprised to find that there were no old tombs there. It was very natural for me to look about the old churches in such a country as Mexico for historic relics of that character, but I looked in vain. I never saw but one tomb belonging to the eighteenth century: that was the tomb of Antonio Maria de Bucareli who was Viceroy from 1771 to 1779, and whose burial place in the Collegiate Church of Guadalupe is marked by a bronze tablet in the floor containing a long inscription. I found perhaps half a dozen tombs belonging to the early half of the present century, and these were scattered throughout the country, in churches, not in burying-grounds. This is easily explained as I found when I began to inquire into the reason of things. It is only recently that the custom of providing a permanent burial place for the dead has come up in Mexico. It is a right obtained by purchase, and when so obtained it is expressed upon the tomb. That is the meaning of the words *in perpetuo* clearly inscribed upon the tombs of the wealthier classes in some of the cemeteries of Mexico. The occupants of those tombs are to rest undisturbed. All others are transient lodgers only. The time allotted to them varies according to the price paid. For the very poor it is very brief. I once saw an inscription upon a tomb in a large cemetery in the suburbs of the capital, which read as if a sarcasm upon this custom were intended:

"HERE LIES BURIED, FOR TEN (10) YEARS, THE BODY OF ——."

What becomes of bodies when the leases of their tombs expires, I have only heard through vague rumors. But these rumors suggested that it would not be wise for me to push my inquiries very far in that direction lest something should be revealed to me too revolting to be remembered without discomfort.

The rural burial places of Mexico are not generally of an attrac-

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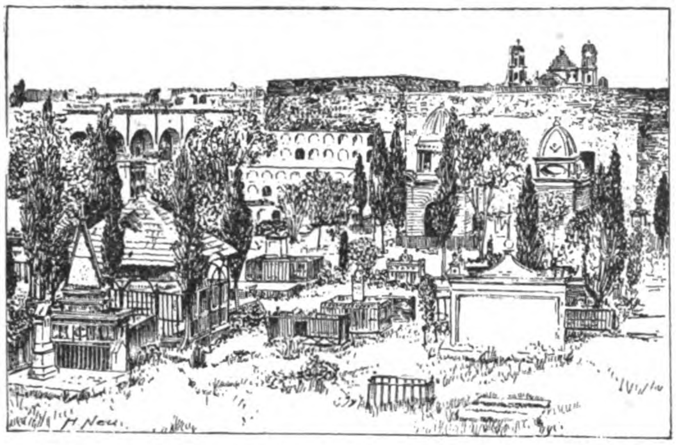
tive appearance. I shall never forget those which I saw in Northern Mexico. They were of such a forbidding aspect as to add a new terror to death. No attention was given to their adornment except on *el Dia de los Muertos* — the Day of the Dead, or All Souls' Day (November 2d) when graves are generally decorated throughout the land and special masses are said for the repose of the dead. The best burying-ground I ever saw in Northern Mexico might easily be mistaken for the Potter's Field. Apparently the most barren spot was selected for it, and when in one case a railway was built directly across a burying-ground in a town of some size, it excited no interest whatever. Black wooden crosses are generally used to mark the temporary lodging-houses of the dead. *Adobe* tombs are sometimes constructed, and these are more forbidding in appearance than the crosses.

The cemeteries of the larger towns of the interior are great improvements upon what I saw in Northern Mexico, though these generally give evidence of the recent introduction of less barbarous customs in regard to the disposition of the dead. I visited cemeteries in Vera Cruz, Jalapa, Puebla, Toluca, Queretaro and other towns, besides all those of the city of Mexico. They all possessed certain features in common, which might be regarded as the distinctive traits of Mexican burial places. One would be conscious of the existence of these features upon entering one of these cemeteries without being able to discover and localize them, or precisely to define them. It may have been in the general air of neglect — of carelessness as to what disposition was made of the dead. In the city burial place in Jalapa there were some buildings of pretentious appearance, but they were constructed of cheap materials, were suggestive of speedy decay, and were found upon inspection to contain mural tombs *for rent.*

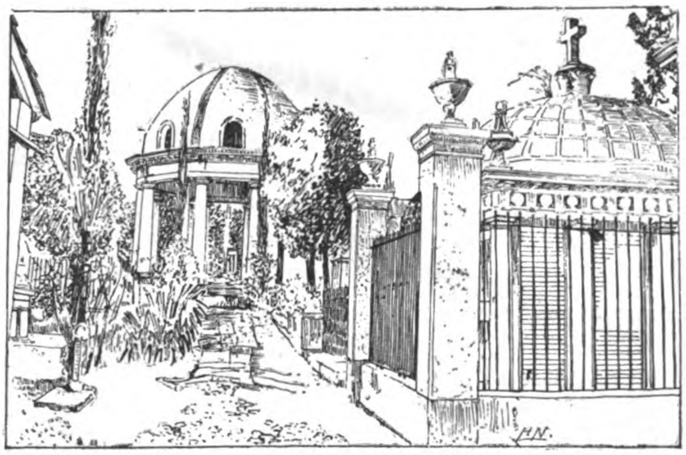


Panteon de San Francisco, Pueblo.

It was in the city of Mexico that the most satisfactory of my observations were made upon the subject of burying places. The influence of a large foreign population has evidently been felt there in this matter. The English and the American residents have cemeteries of their own, adjoining each other at Tlaxpana, just outside the city. There is a French cemetery also at La Piedad. Probably it was originated by the French residents, but it has become a favorite with the wealthier Mexicans, especially those who have imbibed French ideas by long residence in France. It might still be entitled to the name of "French Cemetery," were it wholly given up to Mexicans, by reason of the French taste displayed in it. It is worth a visit. It seems to represent all that now remains in Mexico of loyalty to the Church of Rome. I think that one feels in La Piedad Cemetery, as nowhere else in Mexico, the existence of a religious atmosphere. A religious sentiment is expressed upon the gateway, "Blessed are the dead who die in the Lord," and that sentiment seems to pervade the whole cemetery. There is a little row of graves of Sisters of Charity, and here and there one finds the grave of a priest. Neither are to be found in any of the other burying places — even those which nestle closely up under the shadows of the great churches; and the handsome mausoleums to be found in this cemetery (some of them quite as artistic in design as any I have seen in Greenwood or Mount Auburn) belong to families who have remained loyal to the Church of Rome at the sacrifice of political power under a Government inimical to the Church.

Panteon Santa Clara, Toluca.

I found in the city of Mexico two names in use to denote burying places. Both may be generic, but *cemetario* seemed to be applied more generally to the suburban cemeteries — those which I have mentioned and also Dolores, which is thoroughly Mexican, though more after the pattern of the foreign cemeteries. *Panteon,* on the other hand, is in general use throughout the country, and seems to include any kind of a burying place, though in the capital it is more generally applied to the narrow, compact, overcrowded burying-grounds within the city walls, and commonly attached to churches.

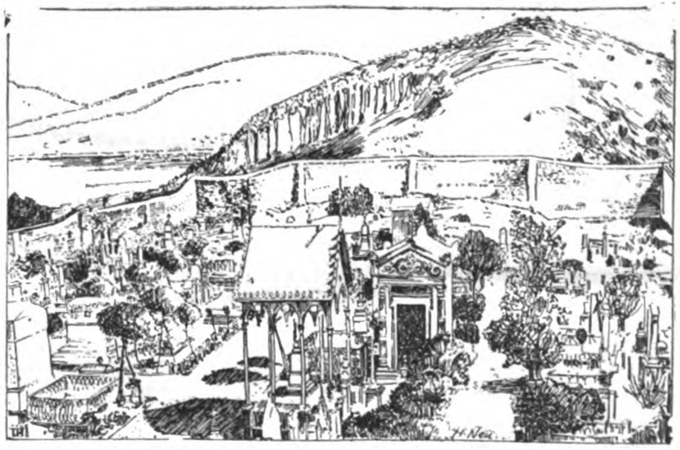


Panteon Municipal, Jalapa,

The *panteons* present the most interesting phase of this subject for our consideration. The *panteon* of Tepeyac, on the hill back of Guadalupe, is a good example. It shows some of the elegance, as well as some of the bad taste, to be found in Mexican burial places. Graceful canopies of cast-iron, massive tombs of stone, elegant mausoleums decorated with Mexican onyx, all crowded together, the whole surrounded by an *adobe* wall. This *panteon* contains one notable tomb. It is that of General Antonio Lopez de Santa Ana, whose name is better known to Americans than that of any other Mexican.

The most notable of all the *panteons* of the capital is that of San Fernando — almost in the heart of the city. It is the Santa Croce of Mexico. It contains the dust of the most illustrious persons of the last half century of Mexican history. There are greater men reposing here than in La Piedad, yet one does not feel oneself in such refined company in San Fernando as in La Piedad. Although the *panteon* is actually within the walls of the Church of San Fernando, the great men who repose here, were, for the most part, the enemies of the Church. Their greatness was acquired in the politics of Mexico.

The tombs of President Juarez, President Guerrero and President



Panteon del Tepeyac, Guadalupe.

Comonfort are here. General Zaragosa, the hero of Puebla, is buried here. Miramon and Mejia, the two brave generals executed with Maximilian in 1867, are buried, one on either side, not far distant from the tomb of Juarez who signed their death warrant. Many others who took part, on one side or the other, in that famous struggle between the Republic and the Empire, rest within the enclosure of San Fernando.

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In this *panteon* may be seen to good advantage the mural tombs in general use in *panteons* throughout the country. There are the same reasons for their existence here as there are in New Orleans, where underground tombs are impossible, viz., a wet, spongy soil. Probably all the tombs of San Fernando are above ground. Cremation is not, so far as I know, practised in Mexico, but I once discovered, in a dark passageway leading from the *panteon* into the Church of San Fernando, a shelf upon which were urns containing the ashes of the dead. Probably ashes produced by the natural process of decay.

While San Fernando possesses the most beautiful specimen of monumental statuary I ever saw—the tomb of Juarez[1]—the tombs generally do not compare favorably with those of the better class of cemeteries. They are generally of conventional designs, and San Fernando has the appearance of neglect. But in most respects it is the best example of a Mexican burial place.

Arthur Howard Noll.

The Illustrations

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

BANK-BUILDING ON WALL STREET, NEW YORK, N. Y. MR. W. WHEELER SMITH, ARCHITECT, NEW YORK, N. Y.

[Gelatine Print, issued only with the Imperial Edition.]

HOUSE FOR FLETCHER COWHERD, ESQ., KANSAS CITY, MO. MR. A. VAN BRUNT, ARCHITECT, KANSAS CITY, MO.

THE house is faced with stock bricks trimmed with light-brown Carbondale sandstone. Hall and staircase finished with white-oak; remainder of interior finish, red cypress. Plate-glass in windows of principal rooms. Total cost, including mantels and hot-water heating, about $18,000.

OFFICES OF THE MUTUAL INSURANCE COMPANY, FREDERICK, MD. MR. J. A. DEMPWOLF, ARCHITECT, YORK, PA.

HOTEL AT LITTLE FALLS, MINN. MESSRS. GILBERT & TAYLOR, ARCHITECTS, ST. PAUL, MINN.

BLUEFIELD INN, BLUEFIELD, VA. MR. GEORGE T. PEARSON, ARCHITECT, PHILADELPHIA, PA.

HOUSE OF E. O. SCHUYLER, ESQ., BERGEN POINT, N. J. MR. CHARLES EDWARDS, ARCHITECT, PATERSON, N. J.

THE ARMSTRONG HOUSE, ROME, GA. MR. G. L. NORRMAN, ARCHITECT, ATLANTA, GA.

A Scheme to Bridge the English Channel.—The scheme of constructing a bridge over the English Channel has just been completed. It has been worked out by the Creusot engineers and M. Hersent, ex-President of the Society of Civil Engineers. The progress of metallurgy makes the construction possible of an immense bridge thirty kilometres long, with a platform at the height of fifty metres above the sea at full tide, and supported by piles at distances of five hundred metres. The height allowed for the bridge over the Channel would allow large steamers and sailing vessels to pass freely. It would support four railway lines, besides a road for carriages and foot-paths. This will be satisfactory for those who dread seasickness. The only trouble left them will be that of choosing their mode of locomotion—whether by railway-carriage, omnibus, cab or velocipede. Places of refuge, watch-houses and alarm bells will be placed on each pile, with a powerful light. The authors of the gigantic scheme believe that the foundations may be constructed by means of compressed-air diving-bells, the depth of the strait between Calais and Dover not being on an average more than from twenty-five to thirty-nine metres, and in few places exceeding fifty metres. The bridge will cost 800,000,000 francs, its metallic weight will amount to 2,000,000 tons and it might be constructed in six years. The scheme will shortly be submitted for an examination to an international technical committee. When this examination has been completed, the Channel Bridge Society will apply for a concession to the French and English Governments from which it will ask no subsidy. Under these conditions the concession might be easily granted and the works immediately begun. In a few years the commerce of the two Nations would benefit from the simplifications introduced into their relations by the execution of a work which might be considered as one of the most important of the century.—*Paris Temps.*

[1] See illustration No. 589, *American Architect*, April 9, 1887.

PAPYRI AND PORTRAITS FOUND IN THE FAIYUM.[2]

Monument to Berryer in the Palais de Justice, Paris. M. Chapu, Sculptor.

BUT little more than ten years have elapsed since discoveries of greatest interest began to be made on the site of the ancient city of Arsinoë in Central Egypt. The fertile province El Faiyum, lying between the twenty-ninth and thirtieth degrees north latitude, a garden of Egypt, is an oasis watered by numerous arms of the Nile and famous for its plantations of sugar, fruits, olives, vegetables and roses. Its capital, Medineh el Faiyum, lies not far from the ruins of ancient Crocodilopolis which received under the Ptolemies the name, Arsinoë. These ancient seats of empire have now at last been raised from the dead, as it were, by the bringing to light of countless thousands of fragments of papyri and parchments, the source of the supply being, as yet, far from exhausted. The unwearied patience and keen insight of scholars engaged in the task of deciphering these venerable witnesses to the centuries of the past have compelled them to break their silence and tell us of the daily life of old. From the time of the Macedonian Ptolemies, down through the period of the imperial Cæsars and extending far into that when victorious Islam imposed another civilization on the submissive people, we have here preserved for us, by the favorable conditions of Egyptian climate, continuous documents filling up the gap of hundreds of years. A century had elapsed since the first papyrus in Greek cursive writing from Egypt came to light, since which time a great quantity of similar documents from the most varied sites had wandered to the European museums and a new branch of historical science had been established. But the sources were apparently drying up and the Arabs seem to have lost sight of the treasure. This, however, can be regarded as a fortunate circumstance, for nothing could exceed their barbarity and stupidity in the treatment of these discoveries. Of the fifty papyrus rolls found with the one brought to light a hundred years ago, it is reported that they were burned by the Arabs, that they might regale themselves in the fragrance of the burning pile. The lost site coming to light again in our more enlightened age, such treatment of the treasure is no longer possible even by the Arabs.

The documents which have found their way to the museums of Berlin, Vienna, Paris, London, etc., are not from one spot alone, but from most widely-scattered parts of the field of ruins of Arsinoë, mostly the accidental discovery of treasure-hunting Arabs. Occasionally large parts of one manuscript have been found near together, so that the difficulty of adjustment proved slight. But the greater part of the fragments are found isolated between the clods of upturned earth, scattered over the ancient sites as the wind has happened to strew them or the hand of man has thrown them aside. Further, being arbitrarily sundered by ignorant dealers, these treasures have suffered the fate of many other valuable antiquities in

[2] A letter by Mr. Samuel S. Mitchell to the *New York Times*.

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our museums. In some cases fragments of the same whole would be widely scattered, a part finding its way to Paris, another to Vienna, a third to Berlin. A whole series of fragments in the Bodleian Library at Oxford were found to fit exactly into the papyri of London. Many fragments may have fallen into other hands and some still be in the possession of the finder. Of the more recent acquisitions of the Berlin Museum, which had already a collection amounting to 3,600 numbers, it may be said that the greatest care has been taken to obtain accurate information as to the exact locality from whence they come. Not all the new papyri come from Faiyum, but the greater part from the neighboring city Herakliopolis Magna and Hermopolis. In the case of the Faiyum treasure proper, pains were taken to ascertain on which of the numerous mounds of fragments of the Arsinoë ruins they were found. Herein lies a great advance on former classification, which gave in general the name Faiyum papyri to all fragments coming from that province, or even from the neighboring provinces; for since the meritorius labors of the African traveller, G. Schweinfurth, have defined the topography of this important province of Egypt, and especially of the old necropolis, Arsinoë is no longer a unit, but we see that the traces of the old city are marked by widely-scattered mounds of débris and fragments. This great accuracy in finding from which of the mounds the fragments come has facilitated the connected treatment of the whole for historical purposes, and that especially since, according to the investigations of Prof. A. Ennan of Berlin, the development of the city in the course of the centuries shows a gradual transfer of its site from north to south.

The work of conserving this mass of material is yet far from completed, and any report as to its contents can at the best be only fragmentary. A great part lies still a conglomeration, rolled together and solid, as when it came to light. To separate these attached fragments the greatest caution is used, the process being to lay them between two dishes, which are then wrapped in wet cloths. The moisture generated serves to loosen the compact mass, and the fragments, often apparently insignificant in size, are then, with infinite pains and many times after prolonged search, fitted into their proper surroundings. The texts are not found to be written exclusively on the usual papyrus, formed from the pith of that reed, growing on the banks of the Nile, but to a considerable extent on rag paper, as shown by the microscopic examination of Prof. Wiesner. This paper is made serviceable for writing by a coating of paste, and Prof. Wiesner has shown that the Arabs of the eighth and ninth centuries were also acquainted with the process of making paper from rags.

The fragments at Berlin include rolls in Greek, Arabic, Coptic, Phlewi, Greek seal writing, Demotic, Hebrew, Criptic writing, Greek tachygraphy, Latin parchments, Syriac papyri, and hieratic writing. Many of the manuscripts baffle entirely the scholars, and the problems in paleography will doubtless long remain unsolved. One singular class of fragments is made up of those in which a mosaic of entirely disjointed bits of writing, running in every possible direction, is found on a single leaf. Whether artificially produced by the sly Arabs for trade or the result of the pressure of the superincumbent sand through centuries, these remnants are still an unsolved mystery. Of most general interest are the Greek fragments. Of these a small part are literary remains, remnants of manuscripts of the classical writers, and religious texts, partly on papyrus and partly on parchment — a valuable addition to the material of classical philology. Besides familiar portions of the Odyssey and Iliad of Euripides, Hippolitus, Theocritus's Idyls, of Aristotle's Analytics, of Gregory and Basil, and of the Psalms and Gospels, there were found a new fragment of the poetess Sappho, a fragment of the lost Melanippe by Euripides, an epos which celebrates the combats of the Blemyans, with passages of singular beauty, and, above all, important fragments of the "Politics" of Aristotle, a work the loss of which has been regretted by antiquarians more than any other and throwing light on the development of older Attic history. Especialy to be noticed is a fragment of manuscript containing a speech by Demosthenes against Leptines, from the first or second century A. D. Among the Coptic fragments are many valuable acquisitions. Of special value is a well-preserved, extensive document on paper from Hermopolis Magna, containing a letter by Bishop John of Shmun to the members of his diocese in which he pronounces a dire malediction on those knowing who the thieves are that had broken into the house of a woman, Girampolis by name, yet had not reported them. The curse shall penetrate, he says, into their vitals like oil into their bones and they shall be destroyed like Sodom and Gomorrah. This is a new and interesting illustration of the manner in which, at that time, church discipline sustained the civil power, or, in other words, supplanted it.

But such literary fragments are an insignificant quantity compared with the official files, census lists, receipts for taxes, temple account-books, accounts of private persons, contracts of every kind, business and private letters, and magical writings of the Gnostics, comprising by far the greater part of the rolls, valuable material for the historian and the linguist, such as the past of no other lands affords. Most of these are externally distinguished from the classical fragments by their varied cursive hand-writing, abounding in ligatures and marking the individuality of the writer. The professional scribe holds the pen easily and with graceful elegance; he loves ornamentation and abbreviation. The peasant and the laborer, on the other hand, who record their domestic status for the tax-gatherer, if they write at all, put the letters clumsily in their order, evidently in the sweat of their brow, and know no abbreviations. These characteristics of individual style, as well as the nature and the color of the papyrus, are of great service in putting together the sundered fragments, which, by the way, is pronounced by those engaged in the task to be one of the chief charms of the study of the remains. The documents of this description extend from the time of the Ptolemies through the first centuries of the Christian era, the Byzantine period, and down to the period of the occupation by the Arabs. Many names of emperors occur. These are authentic witnesses of days long gone by. The searcher feels here the pulse of reality. There are no subjective theories and reflections of historians upon their times, but the proclamations of Government, the expressions of subjects, plain, unvarnished facts from which all history must spring. By the aid of these records, as well as those in the other museums, the hope is awakened that much light will be thrown upon the details of the administration of Egypt as a Roman province, especially as concerning taxation, and, as Egypt was the granary of the empire, her economical relations doubtless served as a model for the other provinces. There are preserved many reports of tax-gatherers to the emperors, concerning taxes collected on property and crops, as well as many admonitions of the authorities to the peasantry to be diligent in their labors that they may be able to meet their obligations to the State. We find accurate reports of the personal possessions of the tax-payers, besides those relating to the census and the income and disbursement of the temples.

From the time of the Ptolemies was found a valuable fragment, dating from the first year of King Philometes, 177-6 B. C., accordingly one of the oldest preserved Greek papyri. Fragments from the first centuries of our era are also largely represented. An interesting act of manumission dates from the third century. An excellently-preserved and splendidly-written contract from the fifth century of Diocletian stipulates for the purchase of a male Arabian camel. One fragment instructs us in the full titles of the Palmyrene King Vallabath, of whom our knowledge has been thus far limited to the short and ambiguous stamps on his coins. The records of the later centuries have, in general, a more private character and throw light upon the practical application of Roman law in the province and, hence, upon the history of jurisprudence. The number of contracts dating from the sixth and seventh centuries is very large, as from the reigns of Justinian, Justus II., Tiberius, Maricius, Phocas, and Heraclius; even from the Arabian era contracts are found, dated according to Diocletian chronology. Much light is thrown upon the elaborate bureaucracy of the Byzantine age with hitherto unknown official titles. Where the Greek scources leave us, the Arabic take up the thread and show us the picture of the administration through centuries. So long continued an historical tradition as that of Egypt, extending through thousands of years, has no other land. The oldest preserved hieroglyphical monuments extend far up in the thirtieth century before Christ, and when we consider the height of civilization reached at that time, we are compelled to go back many centuries still to find the primeval race. After the hieroglyphics, the national sources flow, now more freely, now more sparingly, and from them we learn the fate of dynasties and generations till after the conquest by Alexander, when the Greek sources are supplanted by the Arabic, which serve to join the older tradition on to modern Arabic history. And so we follow up the unique civilization of the Nile, and herein lies the special value of the discoveries at Faiyum that by them a break of several centuries is filled up.

From these ancient fragments Greek philology reaps its harvest in the dialetical variety furnished by the official style and popular language. A new epoch begins for paleography with the tremendous increase of material. Egyptology is enriched, for the innumerable proper names in Greek transcription, found in the papyri, as well as the Coptic fragments, furnish an invaluable aid in the vocalization of the Egyptian. Finally, from these rolls will in time be supplied a fresh, living picture of the life of a Roman provincial town. The old city of the crocodile-headed god stands, if not before our actual sight, at least before our mental vision. The names of streets, places, theatres, temples, gymnasiums, hippodromes, and baths which adorned the old Egyptian Hellenic city make Arsinoë, like other Egyptian cities from which we have papyri, a living reality.

Besides the papyri, there is another class of written monuments from Egypt, which, likewise, reveals much of the ancient days. These are fragments of pottery called ostraca. The Arabs, in their proneness to writing, were not over particular in their choice of material. Those for whom papyrus was too dear resorted to most varied material, leather, wood, bits of limestone, and fragments of pottery. The latter were, in fact, a favorite, so that even upon this modest material we find official documents inscribed. The Berlin Museum has now over a thousand of such ostraca, partly from the southern confines of Egypt, from Elephantine, an island opposite Assuan, near the first cataract, partly from Ermut (Hermonthis), the bulk, however, found in the ruins of Thebes, near the present villages of Karnak and Luxor, and on the opposite shores of the Nile. The Berlin Museum has also about 70 ostraca from Sedment, near the boundaries of Faiyum. Upon them were found as in the case of the papyri, most varied writing. The demotic fragments come from the time of the Ptolemics and the beginning of the Roman period. They comprise receipts for payment of taxes, letters, formulas of oaths, etc. The Greek ostraca are from the same period as the demotic, but extend also far down into the Byzantine period. The Coptic are probably exclusively from the hands of pious Christians, and contain mostly prayers, ejaculatory appeals to God, and

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letters full of Christian exhortations. In some cases bilingual inscriptions, demotic and Greek, were found upon the ostraca. The receipts for taxes, which go to make up a large part, are of interest as aiding in the investigation of the financial administration of Egypt and the ancient world in general. To give a clear conception of these receipts the following interpretation by Dr. Wilkens may be of service: "Valerian and the other farmers of the 'Holy Gate' in Syrene, by Sarapion, the scribe. Harpoësis, son of Phanopis, by the mother Tachomtbitis, has paid the trade tax for the second year of Hadrian, our Lord, with twelve drachmas — 12 dr. Anno 3 of Hadrian, our Lord, 17th day of Thoth."

The recent discoveries in a necropolis, not far from Arsinoë, have thrown unexpected light on old Greek portrait painting. These portraits, which were taken from the mummy shrouds, will interest not only the archæologist and historian of art, but all friends of painting and its history. The first supposition was that they represented the citizens of Arsinoë, which was doubtless the most important of the Roman cities of that province. But the portraits were found in a rocky cave, fully 16 miles from the city, near a place called Rabayat. This spot is near the site of the ancient town Kerke, which held only a remote connection with Arsinoë and belonged to the Province of Memphis. The more probable assumption then, is that the inhabitants of Kerke are represented here. With the portraits were found three wooden tablets, informing us that the burial places of Rabayat belonged to the harbor of Kerke. Although the description of Kerke as a harbor does not agree with its present condition, yet the hydrography of the region indicates clearly that it once was in easy communication by water with the neighboring avenues of trade, and the remains of a pyramid in its vicinity having no connection with Memphis, indicate that it may once have been an important city.

The custom of portraying the deceased in the receptacles of the mummies was prevalent at an early day in Egypt. This in the oldest times was done, not by painting, but by carving at the head of the sarcophagus. The hands were also carefully carved, while the rest was represented as wrapped in the mummy shroud. Such sarcophagi were of stone, wood, and papier-maché. In those made from the latter material the portrait was treated in color as well, and though there are occasional instances of speaking, plastic portraiture, they are all, without exception, handled in the unsymmetrical flat method of this branch of Egyptian plastic. Mummies, like these found at Rabayat, in which the portrait is given, not in plastic form, but by a painting on linen or on a wooden tablet, having its place in front of the head, are very rare, and such as have been previously found do not approach the recent discoveries in artistic value. Unfortunately the Egyptian fellah who opened the rock cave of Rabayat had torn the wraps and portrait tablets from all the mummies; still, it was possible to ascertain the manner in which the portraits were attached. The wooden tablet was fastened with pitch on to the mummy-wrap, and, to give additional security strips of linen running around the wood, like a frame, were likewise fastened with pitch, first on to the wood and then on to the mummy. But one inscription was found on the Rabayat mummies, which, from analogy, probably was the word used in parts of the Hellenic world as an exhortation to courage in the trying hour. The portraits are without exception painted on thin panels of sycamore wood, in wax encaustic colors. All that we know thus far of this method is that the various colors were mixed with wax and blended by means of heat and the use of small instruments of metal. These discoveries will doubtless make possible a nearer acquaintance with this technique. Of 66 portraits, mostly busts, 3 were of old men, 24 in middle life, 4 youths, 3 boys, 29 maidens or young women, and 3 matrons.

These numbers are stricking, especially when we remember that death's ravages are greatest among the classes here most sparingly represented. Of 25 young infants and aged women there were found no portraits. Was this because the babe was not considered of sufficient importance to receive the honors and accompanying cost of portraiture? Moreover, it seems that the Greek sense of beauty rebelled against depicting the wrinkled features of age, although a few old men with expressive countenances were preserved. The supposition that it may have been usual, while still in the bloom of health, to sit for a portrait, and that the likeness after death was placed on the mummy, may meet with some advocates, since we know that the Princes and great ones of Egypt occupied themselves with the preparation of their tombs and funereal vaults; but the more likely hypothesis is that only the portraits of such were attempted whose countenances seemed beautiful or important enough to their friends to be preserved to future generations. That all the portraits belong to those of the better and in fact of the highest rank is evident from the aristocratic clothing as well as from the laurel wreaths and chaplets of gold about the heads. This impression is strengthened by the exquisite beauty of the youthful female heads. An indescribable air of nobility seems to hover about them. The finely modelled Greek features, the undulating locks of golden hair which adorn the head and brow, the expressive eyes which look up from the wooden panels, just as they did nearly 2,000 years ago, would at least awaken homage and wonder as much to-day as then, could they live once more among us. The women nearly all have ornaments and often jewels of great value. Looking carefully at the faces, we find that few can be ascribed to that type generally known as Egyptians, from the monuments, the descriptions of the Greeks, and the appearance of the Copts of the present day. And although the dark complexion in these faces is thus ascribed to the Egyptians by Greeks and Romans, it is to be considered that the southern sun soon browns the northern faces, and the Hellenistic Greek, whose colonies occupied Egypt generation after generation, would hardly have retained the fair skin of his motherland. In any case, most of the countenances seem to betray Greek features, and this is true of several with dark complexions. Among the rest must be noticed six of a decided Semitic type, and this will not awaken surprise when we consider the position of the Hellenistic Jews in Alexandria. No. 64 is interesting as representing a man in whose veins flows Ethiopian blood. The woolly hair, thin mustache, as well as the prognathous jaw, are, however, joined with the light brown Egyptian skin, strong beard, and other features which mark a mixed descent. The excellence of these works would lead to the supposition that they represent the Hellenistic art of Alexandria and in some cases the work of great masters, and, as we know that the citizens of Arsinoë, in order to do honor to the highest imperial officials, employed at great expense a rhetorician, brought from Alexandria, to prepare a suitable address, the conjecture is readily at hand that a rich man of Kerke in order to honor the memory of his deceased wife or daughter might engage the services of some great master of the art in the metropolis. Such a call would certainly not be inexpensive, for under the Ptolemies the services of the greatest masters were weighed in gold, Ptolemy Soter paid Nikius $90,000 for his Nekya, and Pamphilos took a tuition fee of $1,200 yearly from his scholars.

While our knowledge of the capabilities of the old Greek painters has been thus far confined to a few frescos and vases, and while no panel painting, except perhaps the Muse painted on slate at Cortona, corresponds to our high conception of their power, the discovery of these portraits shows that if in this provincial town of medium size pictures could be found of such worth, by no possibility the work of the greatest masters, then the capital of Egypt certainly would have furnished works of still more surpassing excellence. Still another explanation may be found for these extraordinary portraits in so comparatively obscure a place. The necropolis of Kerke held a peculiar position belonging to those which had especial attractions. We know that the ancient custom was still kept up in Hellenistic Egypt of transporting embalmed mummies to place them in favorite necropoli. In early times the wealthy subjects of the Pharaohs conveyed their friends to Abydos, and the same was true after the Hellenizing of Egypt. That this transporting of remains to Kerke from larger cities occurred, is proved by one of the labels on the mummies from Rabayat brought from Philadelphos. The appearance of such important works of art on the mummies of a provincial town finds an explanation in the fact that rich Hellenic Egyptians in the great cities of the land, and also in Alexandria, sent the bodies of their friends to this spot, which may have been their native place or have offered especial advantages to the souls of the deceased as a place of interment.

The time of the execution of these portraits can only be between the period of the consolidation of Hellenic life in Egypt and the edict of Theodosius, for since the time of Ptolemy Philadelphus (247) the worship of Serapis had begun to flourish, blending the religious sentiments of Greeks, Egyptians, and perhaps Jews. Later than the edict of Theodosius (395 A. D.), the ruler who attacked with such rigor all pagan work, these portraits cannot be placed, for that they represent heathen and not Christian dead there can be no question. The monuments of this class are adorned with many heathen, Egyptian emblems, and with the bands which the Greeks in their own land employed in their funeral rites. The frequent occurrence of garlands of flowers and leaves, a custom rejected by the Christians, would alone forbid any other than a heathen origin for these portraits. In them the characteristics of later Greek come out prominently. The striving is to give the appearance of reality. The individual stands out, not even personal deformities being avoided. One portrait shows us a man with a marked physical deformity of the neck, reminding us of a like representation in the busts of Alexander the Great from the time of Lysippus, and, as in the latter, so here, the artist has preserved the realism in giving the deformity, but avoided any impression of revolting ugliness. Among the better portraits, not one fails to give us the impression that they are of undoubted, speaking lifelikeness, and this applies to the color as well as the form and expression. If we place the brown Hellenic Egyptians, with manly features, speaking eyes, energetic mouth and black full beard, beside the tender maiden with white, rosy tint and wearing a golden chaplet in her black hair and costly necklace of precious stones about her neck, this sharply-defined individuality becomes most evident. But it is not necessary to take such extremes, the same characteristics run through all these portraits, whether of youth, maturity, or age. The art belongs intimately to that stormy age which is so forcibly called to mind in our galleries by the numerous statues, representing every possible phase of human life, from the humble fisherman peddling his wares and the infant struggling with a goose to the dying warrior and the hero triumphant in conflict.

As in art, so in letters, the striving was universal after individuality. The historian of this post-Alexandrian age was also a portrait painter, and sought to give a detailed picture of the characters he discussed, their personal appearance, even their mode of attire, their food and drink, spicing his recital by anecdotes from private life. Moreover, this realistic vein ran through every department of human activity at that time and was the fertile germ of the inductive sciences. The results of this spirit of observation show themselves in the rapid progress made in natural science, medicine, mechanics, astronomy, etc. But this realism had its ideal also, which was truth, and this

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effort to represent life as faithfully and convincingly as possible in art reached not merely after the outward form, but the whole inner life and disposition of the one portrayed. We may well wonder to find works like these coming from Egypt, the land in which the fine arts were so bound by types and canonical rules, and that also from mummy shrouds. But this wonder will disappear as soon as we remember that here, too, Hellenic art, both in sculpture and painting, was able to supplant the national art and that the cultured classes associated themselves with the more advanced civilization in everything that related to the higher intellectual life. Greek had become the language of the educated, and even the native tongue was permeated with Greek words. The Egyptians sought to be distinguished as little as possible from the Greek immigrants in scientific and æsthetic matters and thus became absorbed in the all-pervading spirit of the times.

BUTTRESS AND PILASTER.

Restaurant at Dornbach, Austria. From Architektonische Rundschau.

THE study of a subject which happens to be novel to us may be approached in two ways. Each has its special advantages, and neither therefore can be wisely left entirely aside. But it may make no little difference which we commence with. We may, if we please, plunge at once into the examination of all that has been done and the study of all that has been written,—let us say, respecting buttresses and pilasters. Or, we may take our stand in the first instance at an independent point of view of our own and look at the conditions of the subject in the abstract. By the subject of the pilaster in the abstract, nothing more is meant than a notion of it under the very simplest conditions which will leave it a pilaster still and nothing else. When this notion has been successfully seized, we have mastered a primary definition,—the value of which it was the great service of Socrates to first impress upon the world. We may then advance to a notion of less blank simplicity, and so on to others less and less simple, and to the concrete examples. Sets of concrete instances are thus taken up in classes, one after the other; vigilance only will be found imperative if we are to treat the matter exhaustively, to make sure that at least no important variety escapes the meshes of the logical net.

The best chance of arresting such fugitives is to check our theoretical definitions by comparisons of the scheme with the series of invented and actually executed forms. It will then also be found that our preliminary analysis has wonderfully cleared our ideas and put us well on our way to estimate those forms at their true value, to judge of their consistency,—to mark where art went astray as where it lingered and stopped short.

A grasp of the theory of any art affords a clue through the mazes of the history of art; by occasional recurrence to it we are best preserved from having sympathies and attention engrossed by certain limited developments, and so being led to confound what is accidental with what is essential. So also are we warned that not all development is historical. That human nature does not only copy and only inherit and only pursue a transmitted hint, but that it is capable of true originality in every age,—that in fact there is such a thing as true artistic mother-wit,—as genius.

When we start from the most general definitions that we can contrive, it is easy to distinguish the pilaster from the buttress.

The buttress is an architectural member specifically adapted to resist oblique pressure from above. On the other hand, a pilaster is an architectural adjustment intended and adapted to contribute to the stability of a wall as subject to be affected by direct down press or by transverse lateral pressure.

The stability of a wall is in the first instance in danger from exposure to a weight acting by direct down press. It may even be inadequate to support its own weight. There is a limit to the height to which a wall of a certain thickness, whatever the solidity of its construction, can be safely carried up. The lower part may be crushed at last by the unsparing accumulation of superincumbent weight.

A wall is further responsible for resistance to whatever lateral pressure it is likely to be exposed to by various accidents. A low, thin wall may give way even by a man leaning his back against it; a lofty, thin wall may be unable to resist the impact of a high wind.

It is to preclude disaster from this latter source that Homer in a simile ascribes to the builder of a lofty erection, great accuracy in the close jointing and bonding of his materials. The Myrmidons, harangued by Achilles, take the order which was afterwards known as the *synaspism*:—

Thus saying the vigour and courage of each one he excited,
And the ranks all the more closed up, as they to their king attended;
And, as when a man is constructing a wall with stones closely adjusted,
For a lofty mansion, and takes against violent blasts precaution,
So justly the helmets and shields of bossed circuit were ranging together;
Shield did on shield, and on helmet did helmet, and man upon man press,
And touch did the horse-hair crest upon their shining helmets
As they nodded; so close and compactly by one another stood they.

[Exact literal and lineal translation.]

The obvious remedy is to increase the thickness of the wall absolutely, and its breadth relatively to its height. But this remedy may be applied by either a uniform increase of mass or by stiffening the construction by increased thickness at intervals. Sufficient strength may possibly be imparted by dividing up the wall in this manner, while material is at the same time economized. The effect of any direct lateral push will be thus limited, and the danger avoided of a weaker part being exposed to an extensive leverage.

It is seldom that such a push as a wall has to resist, is a purely lateral pressure; even a heavy gust of wind will usually impinge obliquely from above downwards, and thus to exert what is actually a thrust. A pilaster is therefore certainly in some degree apt to be responsible for that resistance to thrust which is more properly the function of the buttress,—even as the buttress will in some degree be frequently charged with some of the duty of a pilaster.

Still the primary and essential characteristics of the two members are distinct, and it is appropriate, when artistic expression is in question, that each should have its own specifically and decisively pronounced.

The simplest development of the pilaster is a partial advance of the wall from space to space, beyond the plane of the intermediate and general curtain. The projection of such a member is appropriately less than its breadth, as it is in effect only so much of the wall emphasized. The determinations of proportions within this limit remains within the scope of taste and judgment. Something depends on the materials which are employed. It is evident that it would be out of place to advance pilasters from the face of a wall which is visibly constructed of massive blocks; but they lend themselves naturally to harmonize with a construction either of bricks or small stones. A pilaster may be so massive and have such projection as to induce an impression of excessive weakness in the wall which it protects,—a most unfortunate consequence; in such a case it will infallibly appear that the member is an afterthought to prevent the ill-constructed wall from falling down; or its excess of strength will suggest the unpleasantness of tending to break away from a weak and ineffectively bonded associate. Pilasters, again, may be so closely spaced as to forfeit the proper expression of subsidiary character and usurp that of the wall itself — divided by narrow panels.

The most frequent application of the pilaster is at those points of the wall where it receives the simple pressure of the main beams of a roof. Nothing but such absolute vertical down press is recognized as a possibility when the strengthening member has more width than projection. Adherance to such a flat form is rational and appropriate when chapel or church is truly covered by means of the timber truss, and when this is not merely employed to weather fend a roof of arched masonry below. It is therefore inappropriate when arched windows of considerable span give logical intimation that — whatever may be the fact — consistency would be consulted by an interior vault in masonry.

Another application of the pilaster proper, is as strengthening the free end of a wall. It is in this position that we meet with it in the ennobled form of the Greek anta. Here we at once observe the care which the Greek took to preserve its characteristic relation to the wall as its immediate development. He gave it a capital which harmonizes with that of the associated column but is most distinctly different from it; and while its proportions are dependent on the column to which it is opposed, its outline preserves the true verticality of the wall, and it is further united with it by continuous base mouldings.

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The angle of the north portico of the Erechtheum supplies an example of how the simple pilaster is naturally developed into a compound pier or its equivalent, by the concurrence of a proper anta and required termination of a wall. There is but one step from this combination to the free compound pier, — but this step the Greeks seem never to have made or indeed to have had occasion to make. The engaged columns between the windows on the west front of the Erechtheum are appropriately treated as columns, not like the members which answer to them in the interior as pilasters. Their important relation to entablature and pediment above demonstrates that the function of the intermediate wall with large opening is here subordinate.

The Roman architects lost touch of the true idea of the pilaster; they gave them capitals, bases and profiles and frequently flutes like true columns from which they were only distinguished by being flat. The unfortunate consequence was that instead of showing as the wall strengthened they look like weak slices applied upon it. This type is before our eyes commonly enough in London, — a heritage of the days when Pope at least could recognize its falsity:

> Then clap four slices of pilaster on't
> Which laced with bits of rustic makes a front.

True pilastral treatment is exemplified on the exterior of S. Apollinare in Classe at Ravenna, where the entire length of the wall is occupied by a series of flat brick pilasters. They are uniform from the ground-line upwards and connected by arched architraves of like section under the cornice. This is the treatment which reappears in the Romanesque churches of Spires, Worms, and abundance of other structures of the same style and period. Thence it is traceable throughout round-arch architecture and through all stages of its subsidence into pure ornament; an intermediate pilaster is omitted and the arch which it would answer to rests on a corbel; then several such corbels are interposed between pilasters farther apart and at last they become continuous as a corbel table, of bold projection first and then in relief.

Here, as elsewhere, the general tendency of an advancing art to press simplicity to elaboration told with full effect. The Cathedral of Pisa exemplifies how engaged columns were substituted for pilasters on the side walls and how the simpler ornamental arcading in relief developed into open galleries of small arches resting on a multitudinous series of pillarets. Considering the early date of this vast and elaborate cathedral, 1092 A. D., we must credit the architect with at least promoting that application of slender subsidiary columns and shaftlets which speedily, as at Salisbury and elsewhere, had such admirable results.

In the second volume of Fergusson's "*Architecture*" (p. 225) the value of pilastral treatment is conspicuous in the Campanile of S. Andrea, Mantua, as contrasted with the plain surfaces of that of Verona on the opposite page. Still the Mantuan example is manifestly incongruous in this respect, that the strengthened angles continue unchanged through the upper story where not only is the intermediate wall-space almost superseded by a void from the large size of the Gothic windows, but the grand arches of these argue that the chamber within should be vaulted; yet the forms of the external pilasters by the angles, are out of all natural relation with the vault so postively implied.

The manifest capability of a pilaster to give protection to the exposed end of a wall and of a series of pilasters to stiffen a prolonged plain wall, endows the member with an expressive power which is architecturally valuable whether such positive services are really required or not. Pilasters suggest strength when appropriately and plausibly introduced; and they preclude any suggestion of a thought of weakness, which in itself is disturbing.

The essential and primary characteristic of the constructional mass which forms a proper buttress, is its disposal in a manner to secure stability by affording resistance to pressure acting obliquely. The first condition of this is manifestly that it shall be erected in the plane of the line of thrust. The resistance to such thrust is ultimately the solid earth, and the very simplest form of buttress would be a sufficiently rigid prop conducting this pressure in a direct line to the earth as its abutment.

The wide spread which this would necessitate, may be dispensed with in more ways than one. Thrust may be opposed by counter-thrust and so the two be resolved into a vertical resultant. So the adjacent pier arches of the nave of a cathedral, balance each other and rest in common on the vertical pier or shaft below, and the last semi-arch of the series alone is indebted for support to an independent abutment. Some of the most ingenious and beautiful combinations of the Gothic architects are worked out by reliance on this principle.

Otherwise the thrust may be conducted to a mass which shall be sufficiently solid to resist the pressure which is thrown upon it and to form a positive abutment. The efficiency of such an abutment is made up partly by its rigidity which may be equal to resisting the displacing power of the whole or at least a portion of the thrust; — as might be the case if this were received by a firmly fixed vertical iron rod; and then by the downward pressure of a mass acting transversely to the thrust and causing a resolution of forces which deflect it to the solid earth. Such is the effect of loading a pier above the point at which it is subjected to an oblique thrust which tends to push it over. The superincumbent weight supplied in this manner may be so predominant and the mass of the resisting pier also so considerable, that the force of the particular thrust is lost within its mass. But when the concern is with elegant architecture, it is of importance to avoid any appearance of clumsiness, and such an appearance is inevitable whenever means are employed immensely in excess of the requirements of purpose, or of what are naturally suggested as its requirements.

The suggestion of requirements has to be taken into account in fine architecture almost as seriously as actual requirement; it may be of consequence to consult and conciliate it when actual requirement there is none. If the form of a structure inevitably suggests the notion of thrust, this notion must be satisfactorily set at rest by some visible recognition — though actual thrust there may be none. The disquieting notion must be tranquillized by the counter suggestion of provision against it, provision easy and adequate, not overdone and anxious. It is by the invention and application of treatment significent of such provision, that architecture becomes expressive and refined.

In the case of the buttress we find these elements of appropriate expression. The so-called flying-buttress is essentially a member for the transmission of the direct thrust. The erect-buttress in the same plane admits relation to this force by having a projection in excess of width and then by one or more sets-off which intimate the progressive deflection of the counteracted thrust. Finally, a certain load is appropriately added to the buttress above the point where it is met by the oblique pressure, and this contributes to the impression of the steadiness of the general combination. It is important that this superimposed mass should be sufficient to imply that its function is taken seriously; with that allowance it affords a fit opportunity for embellishment. Crockets and panelling and even niches may give ornamental finish to conspicuous pinnacles and may be felt as symbolizing the ease and repose of power so conscious of sufficiency as to afford a surplus for the indulgence of pure delight.

When the mass above the point of abutment is frittered to a slender pinnacle, it loses its expressive value, whatever may be the beauty of its details. This crowning member is, in fact, the capital of the buttress and like the capital of a column challenges a degree of ornamental treatment of a style and degree which shall not vitiate its functional importance.

As regards a buttress which meets a wall it may appropriately die into it at a steep slope at the summit and so give the same acknowledgment of thrust which is conspicuous in the free flying-buttress; but otherwise dignity is consulted by the off-sets below being both shorter and less steep, expressing thus comparative indifference to the original direction of the force which is assumed to be ultimately lost as it descends.

The organic connection of the buttress at large with the main structure is usually sufficiently displayed by occasional continuous string-courses and by its participation in general base mouldings. The model of the plain flat pilaster was long adhered to and even after the adoption of vaulting demanded a change of treatment; it figures accordingly in many variations as a Norman buttress in virtue of its misapplication. The natural propriety of a model which should have more projection then breadth was recognized at last and by degrees adopted universally. A lingering feeling for the superseded form restrained in many instances the reduction of the unnecessary breadth; but the true idea of the buttress when fairly recognized, developed with an energy and variety of which we have multitudinous and glorious examples. The exuberant invention of the mediæval architects which seems inexhaustible in combinations of vaults and arches, and the resources at their command invited them to exploits so daring as to put to the test all the capabilities of such an aid to construction as the buttress. Their anxiety to make the very most of their materials while still securing stability and equilibrium, operated in the same direction.

It would be too much to say that while the buttress was admirably developed and put to its true purpose, it was never put to any other. If what were in fact a pilaster had once been made to do duty as a buttress, the buttress in turn was not unfrequently employed for a pilaster, as employed in positions where whatever may be the actual fact there is no appearance of the existence of such a thrust or suggestiveness of thrust as will justify the application of the buttress form.

It is not even every thrust which demands the relief of a buttress, arches of moderate opening and light mouldings declare themselves as perfectly maintained by the mere rigidity of the wall in which they are inserted; in other cases as in the name of a cathedral there is sufficient mass in the "antique pillars' massy proof" to carry down any lateral pressure and then the counter-thrust of adjacent arches results as already noticed in a composition of force which is equivalent to vertical down press. A buttress where a buttress is manifestly not required is an intrusive impertinence; a buttress over-pronounced for its occasion sins by the clumsy officiousness that encumbers by proffered help. A buttress which may be appropriate in itself but of which the requirement is absolutely masked is unfairly left deprived of its true justification.

Examples of all these errors are salient to view among some of the very best achievements of the mediæval architects. It is well that we should note this. Moral nerve as well as critical is braced by not flinching from calling to account, when we believe they deserve it, even those whom we acknowledge in so many respects as masters. Some of them may always be called in as assessors in judgment upon others.

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The buttress never attained and probably is not susceptible of the same independent beauty as the Greek column. It was this beauty which caused the column to be introduced so frequently as a purely ornamental feature. To this there may be no objection so long as it was not so employed in a combination which suggested to the mind that it was degraded from its proper character and reduced to idleness. A majestic column is an anomaly when it merely supports a segment of a broken establature and has no real work to do beyond exhibiting itself. There is not the same objection to the employment of smaller columns in trivial but graceful combinations; and architectural records can produce many examples of compositions in which columns and architraves and even pediments are treated very unceremoniously if we regard their original proprieties, but with a free grace approaching to playfulness which is not always out of place and may be very engaging.

The nearest approach to such purely ornamental employment of the buttress is also in works of reduced general dimensions, as in the tabernacle work of chantries and tombs. In these we often find them combined and grouped with interesting ingenuity and what may be called picturesque effect, even when incongruously applied to screens the solecism is masked by diminutiveness. But the buttress like the column has unfortunately been too often seized upon as a conspicuous feature available for giving the relief of a certain variety in places it has no structural justification for appearing at all. In other cases so much attention has been engrossed by the chance of introducing some variety, that a true structural relation has been ignored and covered up out of view. A buttress perfectly in place has thus been left to itself with quite as little visible excuse as another which is absolutely gratuitous; treatment which goes far to degrade it to the position of one which is manifestly in a useless or in a false position.

How shall we justify a buttress in the plane of an unpierced wall? Not easily, it would seem. Even if the wall is weak, it is in no danger of falling to ruin in this direction; the utmost that it requires is what we have called a pilastral fortifying of its free extremity, or of its angle if it is returned. The buttress in this position is opposed to no thrust, nor is there anything to suggest the notion of such a thrust. Yet we have not to travel far among Gothic designs, earlier as well as later, to find buttresses officiously attending the lateral walls of a porch or a short transept, and even indeed presenting their sides at right angles to the wall in which the inserted arch of a window or an entrance does provide some suggestion of a thrust in an opposite direction. Surely this countersense is aggravated — is duplicated — when another buttress is associated with the first at the angle, in the plane of the transverse and equally unpierced wall.

What, however, shall we say of such buttresses when set at right angles to each other, where the walls in their respective planes are really pierced with arches, and a double suggestion of thrust is indeed not wanting?

It is impossible not to feel that the provisions against thrust are here literally at cross-purposes. Any thrust of an arch in a front wall would only be delivered to its proper buttress, through and across the buttress provided for the thrust on flank, and vice versa. In neither wall has the arch any true, nor any apparent and expressed relation to the buttress which is nearest to it; or, if it has any at all, it is one adverse to its stability.

The two thrusts in fact, so far as they would not counteract each other, would be resolved in the direction of the diagonal of the angle; the logical inference would require the plane of a buttress as common to both to follow this diagonal and buttresses so applied are by no means infrequent in good examples. Still it may be a question whether architecture has even yet said its last word on the most appropriate and effective treatment of them.

The spread of a buttress has a natural relation to the angle of thrust which an arch exerts, or, what is equally important, suggests to us the idea of exerting. The higher the arch relatively to its width, the more nearly will its thrust appear to approach the vertical and the more easily to be resolvable into pure down press. The more nearly then may the buttress approximate to the character of a pilaster, and dispense almost, or even entirely with successive off-sets. The very acute spire of Salisbury, and the acute windows of its tower are buttressed quite satisfactorily to the apprehension of a spectator, by the strengthened polygonal and pinnacled angles. What is required in such cases is sufficient solidity and mass of the wall at the angle to be manifestly responsible for the double pressure. This sufficiency may be emphasized by important pinnacles and by the angles of the towers being carried up as polygonal buttresses, as in the central towers of Salisbury and Canterbury. By such treatment not only are we at ease as to lateral thrusts, but the sentiment is precluded that the diagonal thrusts of internal vaulting may not be provided for.

There is a not unnatural temptation which is too often weakly yielded to, to make use of the buttress as a convenient feature, so to speak, to give variety to Gothic designs however moderate may be the size of the composition. So it is that we constantly see these cross-purpose buttresses at the angles of chancels without the slightest appearance of required responsibility for thrust. They have been seen indeed so disproportionately massive and heavy as to give the wall by contrast, an appearance of flimsiness. Nay, even advanced porches have to be put up with accessories which, if they mean anything in such a position, imply construction too faulty to be left, as construction so little adventurous should be, to its own combinations and coherence.

The motive to obtain the very utmost space for the glazed lights of cathedral aisles, had, at one period, the effect of committing the buttresses to certain incongruities. Their very considerable projection has an appearance of interfering with the light of the windows when these are brought very close up to them; and the excessive reduction of the wall deprives the window itself as seen from without, of its due support; the thrust which its arch implies to the architectural sentiment being thrown incongruously on the side of a buttress which has its office in another direction.

Arched windows involve the presumption of an arcuated and thence of a vaulted interior, which in turn demands expression on the exterior. Such a demand renders the solecism of pairs of buttresses in the planes of the walls at right angles, still more offensive. The diagonal buttress or the strengthened angle becomes imperative if the composition is to have an air of organic vigor and consistency. A glance over the collections of designs of the great cathedrals and more elaborate Gothic churches will give assurance of the force of this observation.

The implication of a vaulted interior in nave and aisles is given decisively by arched west windows and liberally expanded window-lights generally, whether with round or pointed arches. The implication is no doubt frequently unverified upon entrance, and not only aisles but naves also whether in pointed or round arch styles are found unvaulted and never to have been intended to be vaulted. This, however, does not affect the theory, unless so far as theory may protest against a false precedent being made an authority. Theory may protest still more loudly against an aggravation of offence by useless buttresses being set idly against the walls of an aisle which is roofed as a lean-to, while the compliment is not paid to critical eyes, by at least indicating a relation of the buttresses to the vault and roof of the broader nave beyond which has a conspicuous claim to more important assistance.

A high conical roof of a chapter-house, as a semi-cone covering a chancel has no right to exist unless it covers an interior vault, and the existence of such a vault seems to be bound to be acknowledged by the directions of its thrust being seen to have modified the treatment of the enclosing wall. Buttresses at these points are in their place if ever anywhere. If their places lack them and we see only an undifferentiated wall, we may fairly turn away disappointed, or even — and not inexcusably — indignant. It is much the same when buttresses appropriate in position are seen to die into a plain wall below an unaffected and unbroken parapet. We may be certain enough that they have gone on their way to fulfil their function of meeting a line of thrust, but we would fain that this should be more than matter of faith — that it should be directly expressed, frankly declared. It is here at a most important and critical point, that we suddenly lose trace of the framework and articulations of the architectural organism. A uniform roof covers a vast nave from end to end; the sublying skeleton not only does not betray its form by visible modified forms, but neither is it allowed such superficial indications as may be compared to the striping or distribution of spots which intimate on the skin of an animal, some certain differences according to the parts which it symmetrically covers.

True the mediæval architects have left us no precedents; we have to look to Classical architecture to find the interspacing of supports consistently carried up to the subdivisions of the cornice, the spacing of the antifixæ, and thence to the ordination of the tiling and finally of the ridge line. It is even here that the Gothic architect has a lesson to learn from the Classical. Let him take it to heart and the style which he loves will escape the opprobrium of advancing with unrivalled expressive sincerity up to the string-course of the parapet and there deserting him suddenly and completely. The pitch roof which descends well at the rear of a parapet, is offensive in itself and ought not to have been, ought not to be — beyond possibility of harmonized combination; a defect less important but more easily dealt with would be a certain definition on roofing and ridge line of the same lines of force which are constantly so adequately and admirably provided for and proclaimed in the strictly logically distributed buttresses.

W. WATKISS LLOYD.

COMMUNICATIONS

GENERAL MEIGS AND THE NATIONAL MUSEUM BUILDING.

July 4, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs. — Your Washington correspondent is not entirely informed on the history of the National Museum Building. I have not now within easy reference the papers and records in the case relating to the original conception and completion of the plans finally executed, and I do not suppose that the questions raised are of any interest to the public though they are brought before your readers in the issue of the 23d June in such a way as to unjustly reflect upon myself. I find in a pocket-diary, long kept, a note on this subject dated 18th January, 1877, that Professor Baird had called on me the previous evening and requested me to give him the

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ideas derived from some experience in erection of capacious buildings and from observations of foreign museums recently made in a year abroad at his request.

That he had called at my office on the 18th January for further discussion and found me making a sketch of a building. That he requested me to give him this sketch to be placed in the hands of the architects, who subsequently on the 18th February, brought their completed plans to me with a letter from Professor Henry of the Smithsonian asking my opinion whether it could be erected for their estimate, $240,000. I went over the designs with the architect and advised the Smithsonian that I had been asked to give a sketch for a plain brick building for temporary storage of the museum collections, then greatly increased by gifts from the Centennial Exhibition then recently closed, to be without ornament and at the smallest cost. That I believed that a building of 90,000 square feet on one ground-floor, surrounded by a plain brick wall 20 feet high, enclosing another wall of piers and arches of 200 feet square, and having with in it a square of 100 feet with a circle of 100 feet diameter tangent inside it; the whole roofed with wood and tin or slate, and lighted by clerestory glass at the eaves of each section of roof could be erected for $100,000 to $120,000, and that the design presented to me, as worked out from the sketch I had given Professor Baird, somewhat changed, with more elaborate subdivisions which I did not think improved it, and with a good deal of brick and some stone and metal and colored decoration could probably be put up for the architects' estimate of $240,000 including heating, water and gas pipes and drains, and a plain concrete floor over which wagons could bring into the museum the heavy exhibits. The Smithsonian adopted the plan, and while it underwent some modifications during the two or three years before the House of Representatives concurred with the Senate in making appropriation for it, it was finally built and is a satisfactory museum. Some legislators asked that it have in the principal divisions a marble and tile floor and the rest of the interior lower floor was covered with matched boards on joists let into concrete, against my advice, and these floors have of course rotted away.

I remember that Professor Baird explained to me that he had got plans for an extension of the Smithsonian Building, south, but nothing large enough for the purpose, at less than a million or more; a sum he despaired of getting Congress to vote. He said he wanted something of sufficient capacity at a cost which he could hope to secure. This has been accomplished, and more, for the building while not as imposing inside as I proposed, is more decorated both outside and inside in detail, and has a fireproof roof, which I did not propose. The *motif* of the building with me, was the Rotondo, an ancient circular church in Rome, believed to have been a Roman market; but I fixed upon a square, as wasting less of the site with the same diameter. This is the true history of the National Museum Building, a building of which none of those concerned in its erection has cause to be ashamed, and in regard to whose history and design, so far as I know, they have never had any such controversy as your article infers.

As for the other buildings with which I have had to do; they can answer for themselves. An exhaustive treatise would not change them and would not interest your readers; nobody cares who designed or built them. Turkeys, chickens and ducks never live in harmony, and civil engineers and architects employed or not employed by this Government are not likely to be content that a few out of the thousands of public and private works and buildings of the country are committed to the Supervising Architect of the Treasury and to the United States Corps of Military and Civil Engineers. The other side is careful to sink the title of *Civil* and to insist upon designating them as *Military* engineers, availing themselves for this purpose of the fact that the two original corps existing before the war were from military necessity consolidated into one during its progress, and that then there was no time or money for the Government or this Corps to devote to civil constructions or architecture. Purely civil practitioners of engineering and architecture have monopoly of all the railroads, canals, city-halls, courts, warehouses, theatres, stores, hotels, shops, mansions, dwellings, streets, roads, dikes, dams, mills, factories, etc., on which they spend more millions yearly in a single city, like New York, Boston, Philadelphia, Baltimore, Chicago, Omaha, Kansas City, St. Louis, and half a dozen others which might be named, than the engineers and architects of the United States service, do on the whole continent in the same time. But still the constitutional grumblers continue and will continue their attacks, on those so unfortunate as to be in Public Service, just so long as the quarrel between geese and turkey, ducks and chickens is not finally settled.

M. C. Meigs.

NOTES AND CLIPPINGS

A Village on the White Sea destroyed by Ice. — Advices from the fishing village of Kerschkaranza, in Kola, a peninsula on the White Sea, describe a wonderful phenomenon, new in Arctic annals, which took place on January 5th last. At 4 o'clock in the morning the inhabitants were awakened by a series of heavy, dull detonations, like heavy artillery. Shortly afterward a great ice wall to the Northwest, several hundred feet high, was seen to be moving toward the village, doubtless in consequence of the pressure of the ocean of ice outside. The ice hills came slowly but irresistibly onward, and passed over the village, which they completely erased, and kept onward for a mile inland. The ice travelled a mile and a half in four hours. The villagers saved their lives, but little else. — *Philadelphia Press.*

A Large Clock. — A new clock weighing 2 1-2 tons has just been placed in the tower of the Glasgow University, similar to the great clock at Westminister. The frame of the clock newly erected is horizontal and of cast-iron planed. It is 6 1-2 feet long, 2 feet wide, and 1 1-2 feet in depth. It is supported on beams built into the wall of the tower, so as to obviate vibration. The wheels, which are of gun-metal, can be moved separately, as the pivot holes are screwed to the frame. The main wheels of the striking and quarter trains are 20 inches in diameter, and attached to them are cams to lift the hammers, which are fixed in iron frames connected with the clock by cranks, and having a check spring to prevent vibration. The weight of the hammer that strikes the hour is 120 pounds and it is lifted 10 inches. There is an automatic apparatus attached to the clock, which stops the quarter peals at night, and starts them in the morning. The escapement of the going part is known as the double three-legged gravity, invented by Lord Grimthorpe. The pendulum is of zinc and iron to counteract influences of temperature. The tubes are arranged so that the expansion of one raises the centre of gravity while that of the other lowers it. The bob of the pendulum is cylindrical, and weighs 3 cwt., and the beat is 1 1-2 sec. The "bolt and shutter" appliance of the nobleman already named, maintains the motion while the clock is being wound. Messrs. J. B. Joyce & Co., Whitechurch, Shropshire, manufactured the clock. — *Engineering.*

TRADE SURVEYS

Trade statistics, whether commercial, manufacturing or financial, present very little that is deserving of notice. Financiers are keeping a sharp eye on all markets, and especially all markets for bonds and securities. Banking interests are not satisfied with the restricted volume of business and low rates ruling. The Commercial Agency reports are written in a spirit of cheerfulness and hopefulness. Private circulars of money lenders and business houses breathe a spirit of confidence in better conditions in the near future. This confidence seems well grounded, but no sudden and widespread activity is probable. The conservative managment that has prevailed will continue. The restriction of production will be kept up until demand proves itself strong enough to absorb more. Prices need not improve to bring this about, and probably will not on account of the enormous waiting capacity. The word of money lenders as to the coming activity is not always reliable, but at present, facts and conditions warrant the views they entertain and express. Building has not been as backward as was supposed. The West has forged ahead. Reports this week from Chicago, St. Paul, Duluth and Omaha in the Northwest, and from Little Rock, Memphis, and some few interior towns in the West and Southwest show, as judged by the absorption of iron, steel, lumber and brick, as heavy constructions as last year. The work is different in many respects from last year. Extensions and improvements take a great deal more material this year. The firmness of prices in a l or nearly all material show that building has been active. The saw and planing mills have not been obliged to stop. Our advices show that with few exceptions, lumber, doors, sash, etc., are in active demand. It is true stocks are large, but the industry is under control of combinations. The price combination on sash, doors and blinds failed recently, not because of enormous stocks, but because members wanted to be at liberty to cut prices for the fall trade if they want to. Chicago is using up more lumber this year than last. The country trade is absorbing more. Michigan manufacturers assert they have sold more lumber this year to go East than ever before; yellow-pine manufacturers certainly have. The use of iron has been almost as heavy as if we eliminate the decreased railroad consumption. The structural mills are as busy. All the brick-makers west of the mountains are as busy. Small machinery makers turned out as much machinery for this half year as last. Car-building is now falling off; but boat and ship building is coming up. All the yards on the Delaware are crowded. The Pacific Coast yards are busy. Lake-craft builders have a full season's work on hand. Water-way competition is steadily increasing, and it is giving the railroad companies lots of trouble, along with the "Soo" tiger that is creating distress among the trunk lines. As fast as older channels of activity become gorged with producing and distributing facilities, just so fast does enterprise break over the bank and dig new channels. Our experience shows that there is no definable limit to the new channels that can be opened. The past twelve months have shown that comparatively unknown industries can be established and built up. The younger men connected with manufacturing interests are making strides that reveal to the older heads that we are but in the infancy of our development. The larger engine, boiler and general machinery makers are now contracting for a great deal of fall and winter work. In fact a substitution of improved machinery is taking place everywhere on account of the competition at work. Margins are narrow everywhere, and a machine that will do more or better work, and use less coal, drives, or threatens to drive those out who do not get the best types and products of mechanical ingenuity: hence much of the visible activity in our machine-shops is not altogether due to an actual expansion of capacity, but to the necessity for providing better machinery to do the work now at our doors. The iron-makers will probably resume work late this month. The coal-producers are mining and selling more coal than last year. The anthracite coal region is four days ahead of last year. Hardware, especially for building purposes, is in active demand. Wagon and carriage makers have as many men employed as three months ago. The textile industry is as it has been for three months — busy in cotton, dull in wool. Boot and shoe manufacturers are maintaining last year's record. There is no pronounced weakness anywhere, but the volume of business for the first six months of the year, according to clearing-house exchanges, show a decline of a trifle under 10 per cent as against first six months last year. There is an easier feeling in industrial circles over the practical postponement of the tariff agitation until next winter. Industrial managers believe that the square presentation of the issue of high or low duties will result in a verdict in favor of high duties.

S. J. Parkhill & Co., Printers, Boston.

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The American Architect and Building News

IS PUBLISHED EVERY SATURDAY BY

TICKNOR & COMPANY,

211 TREMONT ST., BOSTON, MASS.

For the American Architect and Building News Co.

Advance Subscription Rates.

Regular Edition, $6.00 per year; six months, $3.50.

Gelatine Edition, $7.00 per year; six months, $4.00.

Imperial Edition, $10.00 per year; six months, $6.00.

12 Monthly Numbers, $1.75.

☞ Payment should be made to Ticknor & Co. direct, either by draft or post-office order.

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BUILDING INTELLIGENCE.

roof; cost, $4,400; owner, Chas. Peters, on premises; architect, W. A. Mundell; mason, P. J. Carlin; contractor, J. B. Jacobs.

Fulton St., n w cor. Hudson Ave., rebuild portion of front and side walls and internal alterations; cost, $4,000; owners, R. R. Construction Co. of New Jersey, 31 Sands St.; architect, J. Mumford; mason, T. B. Rutan; contractors, Martin & Lee.

Meserole St., *Nos.* 67-73, three-st'y brick extension, two-st'y addition on present extensions and internal alterations; cost, $13,000; owner, Turn Verein, Brooklyn, E. D., on premises; architect, Th. Engelhardt, on premises; mason, E. Loerch; contractor, J. Rueger.

Chestnut Hill, Pa.—Two-st'y stone addition to the dwell. of J. Sergeant Price, Esq., on the Bethlehem Pike; builder, Wm. C. Mackie, Chestnut Ave.

Chicago, Ill.—J. Carden, one-st'y addition, Cherry St.; cost, $3,000; architects, Olson & Silgner.

A. King, three-st'y addition, Division St.; cost, $2,500; architect, A. Lingren.

Mrs. A. N. Hall, one-st'y addition, Washington Bou.; cost, $2,500; architect, A. Wood.

J. D. Carson, four-st'y addition to theatre, Mowson St.; cost, $5,000; architects, Flanders & Zimmerman.

Detroit, Mich.—Peter Henkle, alterations to brick stores, 49-51-53 Cadillac Sq.; cost, $8,000.

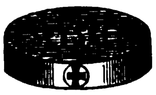
New York, N. Y.—Two-st'y extension added to factory; cost, $20,000; owners, Palmer & Embury; architect, Albert Wagner.

Philadelphia, Pa. — *Chestnut St.* (*rear*) *No.* 1535, three-st'y brick addition to store of back building and new front; contractors, Kister & Orem, 129 South Seventh St.

Letterly St., s e cor. Kensington Ave., front and interior alterations; builder, Frank Deitrich, 2677 Frankford Ave.

Spruce St., *No.* 3713, new front and interior alterations to dwell.; owner, Lewis D. Martin, 3713 Spruce St.

St. Louis, Mo. — Two-st'y brick alteration; cost, $6,000; owners, Carmelite Convent; builder, T. Gugerty.



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APARTMENT-HOUSES.

Brooklyn, N. Y.—*Hewes St.*, e s, 107′ n Marcy Ave., four-st'y brick and terra-cotta flat, tin roof; cost, $10,000; owner and contractor, J. H. Hoffman, 287 Hewes St.; architect, H. W. Billard; mason, — Killduff.

Orange St., n w cor. Hicks St., five-st'y brick apartment, tin roof; cost, $23,000; owner, Geo. F. Rogers, 56 Pineapple St.; architect, S. Newell.

Chicago, Ill.—J. L. Dickhaut, two-st'y flats, Oakley St.; cost, $3,000; architect, E. Schneider.

A. Tait, two-st'y flats, West Division St.; cost, $4,500; architect, H. Kley.

T. Henry, two-st'y flats, West Thirteenth St.; cost, $3,000; architect, C. Zielke.

E. Imhoff, two-st'y flats, Fremont St.; cost, $4,000; architect, J. Schnorr.

J. B. Carroll, three-st'y flats, West Harrison St.; cost, $4,000; architects, Tobin & Raycroft.

F. Heimze, four-st'y flats, Wells St.; cost, $10,000; architect, C. F. Herman.

D. C. Furguson, two-st'y flats, Thirteenth Pl.; cost, $2,800; architect, J. H. Carpenter.

W. B. Lynch, two-st'y flats, Laughton St.; cost, $2,600; architect, C. Meher.

C. Franz, two-st'y flats, Winchester Ave.; cost, $3,000; architect, A. Bessler.

L. Warneke, 2 four-st'y flats, Larrabee St.; cost, $10,000; architect, C. H. McAfee.

R. D. Kerby, four-st'y flats, Ohio St.; cost, $10,000; architect, W. L. Carroll.

N. T. Quales, 2 three-st'y flats, Robey St.; cost, $11,000; architects, Thiel & Lang.

P. Keegan, two-st'y flats, Sheffield Ave.; cost, $3,500; architect, A. F. Pott.

Mrs. M. Thomas, two-st'y flats, West Huron St.; cost, $4,000; architect, H. Kley.

A. G. Bald, two-st'y flats, West Jackson St.; cost, $3,500; architect, G. H. Koerschell.

F. Dall, two-st'y flats, Ambrose St.; cost, $3,000.

T. Deveraux, four-st'y flats, West Ohio St.; cost, $7,000; architects, Lutken & Thisslen.

D. F. Crilley, 2 three-st'y flats, North Franklin St.; cost, $6,000; architects, Flanders & Zimmerman.

Mrs. H. Keeney, three-st'y flats, West North Ave.; cost, $7,000; architect, Merideth.

Corcoron & Moore, 2 two-st'y flats, Owasco St.; cost, $4,400; architect, T. Foster.

W. W. Connery, two-st'y flats, Hoyne Ave.; cost, $3,500; architect, W. H. Drake.

New York, N. Y. — *Sixty-sixth and Sixty-seventh Sts.*, bet. Tenth and Eleventh Aves., 64 five-st'y flats; owner, John Ruck; architects, Thom & Wilson.

Lexington Ave., 80′ n Forty-seventh St., five-st'y brick flat, tin roof; cost, $22,000; owner, Martin Disken, 155 East Forty seventh St.; architects, Thom & Wilson, 1267 Broadway.

Ninth Ave., e s, One Hundred and Third to One Hundred and Fourth Sts., 6 five-st'y brick flats, tin roofs; cost, $170,000; owner, Elizabeth Steinmartz, 26 West Eighty-fifth St.; architect, E. L. Angell, 94 Liberty St.

Eighty-third St., n s, 275′ e Second Ave., 2 five-st'y brick flats, tin roofs; cost, $32,000; owner, Henry Gottleib, 204 East Eighty-fourth St.; architects, Kurtzer & Rohl, 1 and 3 Third Ave.

Eighth Ave., 50′ s One Hundred and Forty-eighth St., five-st'y brick flat, tin roof; cost, $18,000; owner, Francis Hart, 110 West Fortieth St.; architect, Oswald Winz, 431 East Eighty-seventh St.

Ninth Ave., s s, 75′ 5″ n Sixtieth St., five-st'y brick flat, tin roof; cost, $20,000; owners, Lowen & Halliday, 422 West Fifty-fifth St.; architects, C. Abbott French & Co., Fifty-seventh St. and Ninth Ave.

Eighty-fourth St., n s, 250′ w Eighth Ave., 2 five-st'y brick flats, tin roofs; cost, $40,000; owner, Wm. Griffin, 402 East Fifty-second St.; architect, Geo. J. Bagge, 424 East One Hundred and Seventeeth St.

One Hundred and Thirty-fifth St., s s, 335′ w Fifth

BUILDING INTELLIGENCE.

Ave., 2 five-st'y brick flats, tin roofs; cost, $30,000; owner, Jos. C. Pinckney, 586 East One Hundred and Thirty-fourth St.; architect, Andrew Spence, 2294 Third Ave.

One Hundredth St., n s, 100′ e Third Ave., 4 five-st'y brick flats, tin roofs; cost, $60,000; owner, Philip H. Smith, 884 Third Ave.; architect, A. Spence, 2194 Third St.

Fifty-third St., s s, 60′ e Eleventh Ave., 5 five-st'y brick flats, tin roofs; cost, $104,000; owner, E. F. Striker, 737 Ninth Ave.; architect, Geo. B. Pelham, 51 East Seventy-eighth St.

Eleventh Ave., s e cor. Fifty-third St., 5 five-st'y brick flats, tin roofs; cost, $88,000; owner, Elsworth F. Striker, 737 Ninth Ave.; architect, Geo. B. Pelham, 51 East Seventy-eighth St.

Thirty-fourth St., s s, 185′ w Lexington Ave., eight-st'y apartment; cost, $120,000; owner, Thomas Brennan; architects, Hubert, Pierson & Co.

Stanton St., *No.* 231, five-st'y flat; owner, Thomas Gahren; architects, Thom & Wilson.

Eighth Ave., cor. One Hundred and Forty-sixth St., 4 five-st'y brick and terra-cotta flats and stores; owner, F. J. Schmugg; architects, Herter Bros.

Roxbury (Mt. Pleasant) Mass.—*Lewis Pl.*, off Dudley St., frame apartments, 30′ x 40′; cost, abt. $6,000; owner, Alden Frink; builder, C. H. Blodgett, architect, Alden Frink, Boston.

CHURCHES.

Chicago, Ill. — Calvary Church, one-st'y Church, Western Ave.; cost, $5,000; architect, W. Thomas.

First German Baptist Church, one-st'y church, West Superior St.; cost, $60,000; two-st'y parsonage; cost, $4,000; architect, F. Ahlschlager.

Gettysburg, Pa. — Lieut.-Col. Brua, Philadelphia, Pa., has donated $15,000 for the building of a memorial church in connection with Pennsylvania College; architect, J. A. Dempwolf, York, Pa.

J. A. Dempwolf, York, Pa., is the architect for the National Memorial Church to the Prince of Peace; corner-stone was laid July 2d by Right Rev. Bishop Howe, of Protestant Episcopal Church; cost, $40,000.

Lancaster, Pa. — The Presbyterian Congregation will build a brick and stone church, interior lined with buff brick, clerestory roof; cost, $20,000; architect, J. A. Dempwolf, York, Pa.

Lewistown, Pa.—Brick and stone Lutheran chapel; cost, $5,600; architect, J. A. Dempwolf, York, Pa.

FACTORIES.

Baltimore, Md.—Messrs. Flynn & Emerich are to have built a five-st'y brick factory, n e cor. Saratoga and Holliday Sts.

Brooklyn, N. Y.—*Sterling Pl.*, n s, 85′ 10″ e Fifth Ave., five-st'y brick factory, tin roof; cost, $25,000; owner, Wm. Lane, 123-127 Fifth Ave.; architect, W. M. Coots; builders, Assip & Buckley.

Chicago, Ill.—W. J. Moxley, four-st'y factory, West Monroe St.; cost, $25,000; architects, Wilson, Marble & Lawson.

Detroit, Mich.—A. C. Varney, brick factory, 64-66 State St.; $12,000.

New York, N. Y.—*Norfolk St.*, *No.* 114, six-st'y brick factory, tin roof; cost, $12,000; owner, Abraham Zubrinsky, 437 Pearl St.; architect, Fred Ebeling, 99 East Third St.

Sheriff St., n e cor. Broome St., six-st'y brick factory, tin roof; cost, $75,000; owners, R. Hoe & Co., 504 Grand St.; architects, Chas. W. Romeyn & Co., 206 Broadway.

Greenwich St., s e cor. Thames St., nine-st'y brick factory, brick roof; cost, $250,000; owners, Western Electric Mfg. Co., 70 Trinity Pl.; architect, Cyrus L. W. Eidlitz, 128 Broadway.

Philadelphia, Pa.—*Wallace St.*, s w cor. Pemberton St., six-st'y brick factory; contractors, Geo. F. Payne & Co., 401-409 South Juniper St.

St. Louis, Mo.—Five-st'y brick factory; cost, $50,000; owners, Hamilton Brown Shoe Co.; builder, H. E. Roach.

HOTELS.

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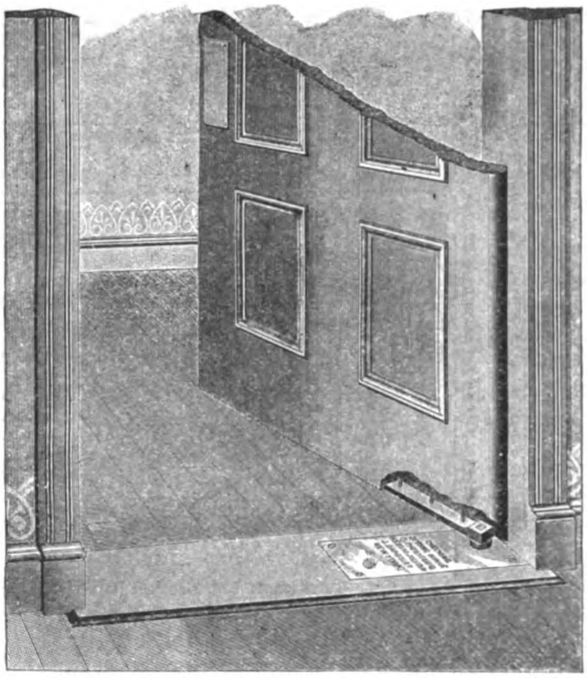

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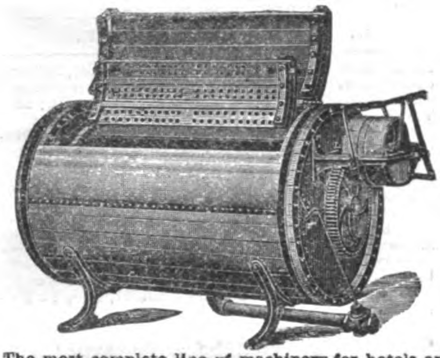

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Brooklyn, N. Y.—*Manhattan Ave.*, w s, bet. One Hundred and Nineteenth and One Hundred and Twentieth Sts., 12 three-st'y brick and stone dwells., tin roofs; cost, each, $10,000 and $12,000; owner, Dore Lyon, 321 West One Hundred and Thirty-sixth St.; architect, W. H. Boylan.

One Hundred and Twentieth St., s s, 82′ w Manhattan Ave. and One Hundred and Nineteenth St., n s, 82′ w Manhattan Ave., 2 four-st'y brick and stone dwells., tin roofs.

Pierepont St., s w cor. Henry St., three-st'y brick and Belleville stone dwell., tile roof; cost, $40,000; owner, Herman Behr, 75 Beekman St., New York; architects, O'Connor & Freeman; mason, J. D. Murphy.

Bushwick Ave., e s, 71′ n Cedar St., two-st'y frame (brick-filled) dwell., tin roof; cost, $5,000; owner, Theresa Kiefer, 951 Bushwick Ave.; architect, Th. Engelhardt; builder, J. Rauth.

St. Marks Ave., n s, 43′ 9″ w Bedford Ave., 3 three-st'y stone and brick dwells., tin roofs; total cost, $20,000; owner, A. C. Brownell, 1211 Fulton St.; architect, P. Gardner.

Eighth Ave., n e cor. Carroll St., 2 three-st'y brick (blue stone trimmings) dwells., mansard, slate and tin roofs; cost, $34,000 and $17,500; owner, Thomas Adams, Jr., 823 President St.; architect, C. P. H. Gilbert; builder, H. Murdock.

Stuyvesant Ave., e s, 21′ 6″ s Halsey St., 4 two-st'y brownstone dwells., tin roofs; cost, each, $5,000; owners and builders, Lambert & Mason, 277 Carlton Ave.; architect, I. D. Reynolds.

Berry St., *No.* 75, bet. North Tenth and North Ninth Sts., three-st'y frame dwell., tin roof; cost, $3,000; owner, Ph. Block, 339 East Fifty-fourth St, New York; contractor, H. Wilkens; mason, P. Freudenmacher.

Hancock St., bet. Sumner and Throop Aves., 5 two-and-one-half-st'y brownstone dwells., tin roofs; cost, each, $5,500; owner, Wesley C. Bush, 750 Union St.; architect, J. G. Glover.

Hancock St., s s, bet Sumner and Throop Aves., 6 two-and-one-half-st'y brownstone dwells., tin roofs; cost, each, $5,000; owner and architect, same as last.

Sixth St., s s, 78′ w Sixth Ave., three-st'y brownstone dwell., tin roof; cost, $4,500; owner, Thos. Butler, 389 Sixth St.

Ashford St., w s, 150′ n Fulton Ave., 4 two-st'y frame dwells., tin roofs; cost, each, $1,600; owners, architects and builders, Whitlock & Hill, 295 Atlantic Ave, Ward 26.

Nassau Ave., n s, 25′ w Russell St., 4 three-st'y frame (brick-filled) dwells., gravel roofs; cost, each, $3,000; owner, Alex. Thompson, 101 Diamond St.; masons, Gately & Smith; contractors, J. A. & W. H. Port; architect, D. Bryan.

Seventeenth St., n s, 77′ w Eighth Ave., 3 two-st'y frame (brick-filled) dwells., gravel roofs; cost, each, $2,500; owner, D. Doody, 502 Ninth St.; contractor, S. C. Prescott.

Madison St., s s, 21′ w Lewis Ave., 4 two-st'y brownstone dwells., tin roofs; total cost, $18,000; owner and builder, Wm. Johnson, 224 St. Johns Pl.; architect, J. W. Bailey.

Grand Ave., w s, 90′ n Putnam Ave., 3 three-st'y brownstone dwells., tin roofs; cost, each, $6,000; owner, M. E. Kingman, 429 Grand Ave.; architect, I. D. Reynolds; builder, S. C. Whitehead.

Bushwick Ave., e s, bet. Grove and Ralph Sts., 7 four-st'y frame (brick-filled) dwells., tin roofs; cost, each, $5,600; owner and builder, R. Healey; architect, I. D. Reynolds.

Boston, Mass.—*Gardner St.*, cor. Chester St., Ward 22, frame dwell., 17′ x 40′; owner, F. W. Moore; builder, S. N. Davenport.

Shurtleff St., near East Chester Park, Ward 20, 3 three-st'y brick dwells., flat roofs, 20′ x 32′; owner and builder, J. R. Bassett.

Avon Pl., Ward 22, 3 four-st'y brick dwells., flat roofs, 18′ x 45′; owner and builder, J. Donovan.

Commercial St., *No.* 554, Ward 6, four-st'y brick dwell., flat roof, 26′ x 29′; owner and builder, G. W. Meserve.

Parker St., off Wexford St., Ward 25, frame dwell., 35′ x 40′; owner, J. J. Flynn; builder, E. Ryan.

New Heath St., *No.* 10, Ward 21, three-st'y frame dwell., hip roof, 25′ x 43′; owner, O. Kohler; builder, W. Tobin.

Spruce St., near Bourne St., Ward 23, frame dwell., 25′ x 33′; owner, A. A. Meyer; builder, E. D. Jones.

Newport St., near Harbor View St., Ward 24, frame dwell., 22′ x 52′; owner, A. G. Davis; builder, A. Geldert.

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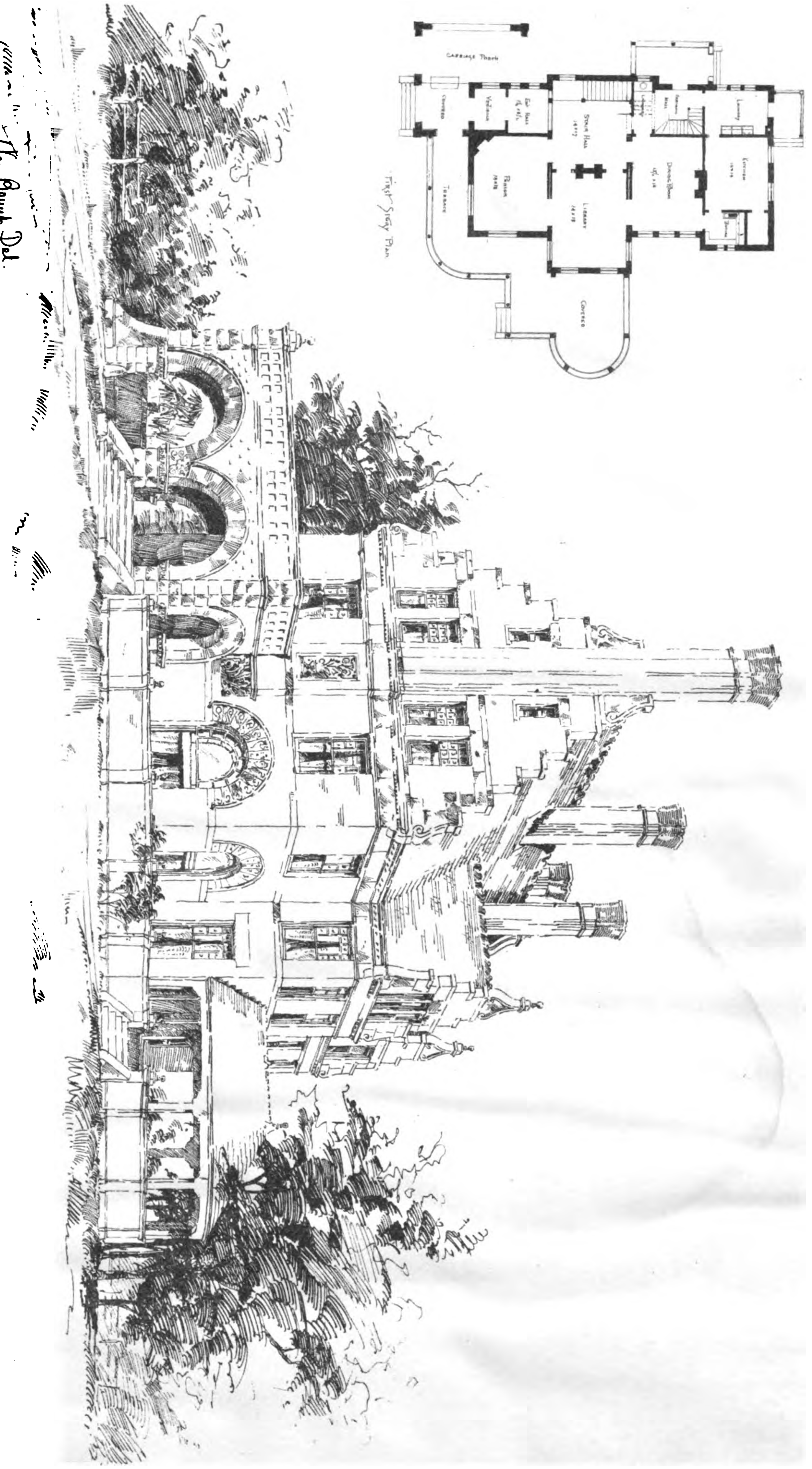

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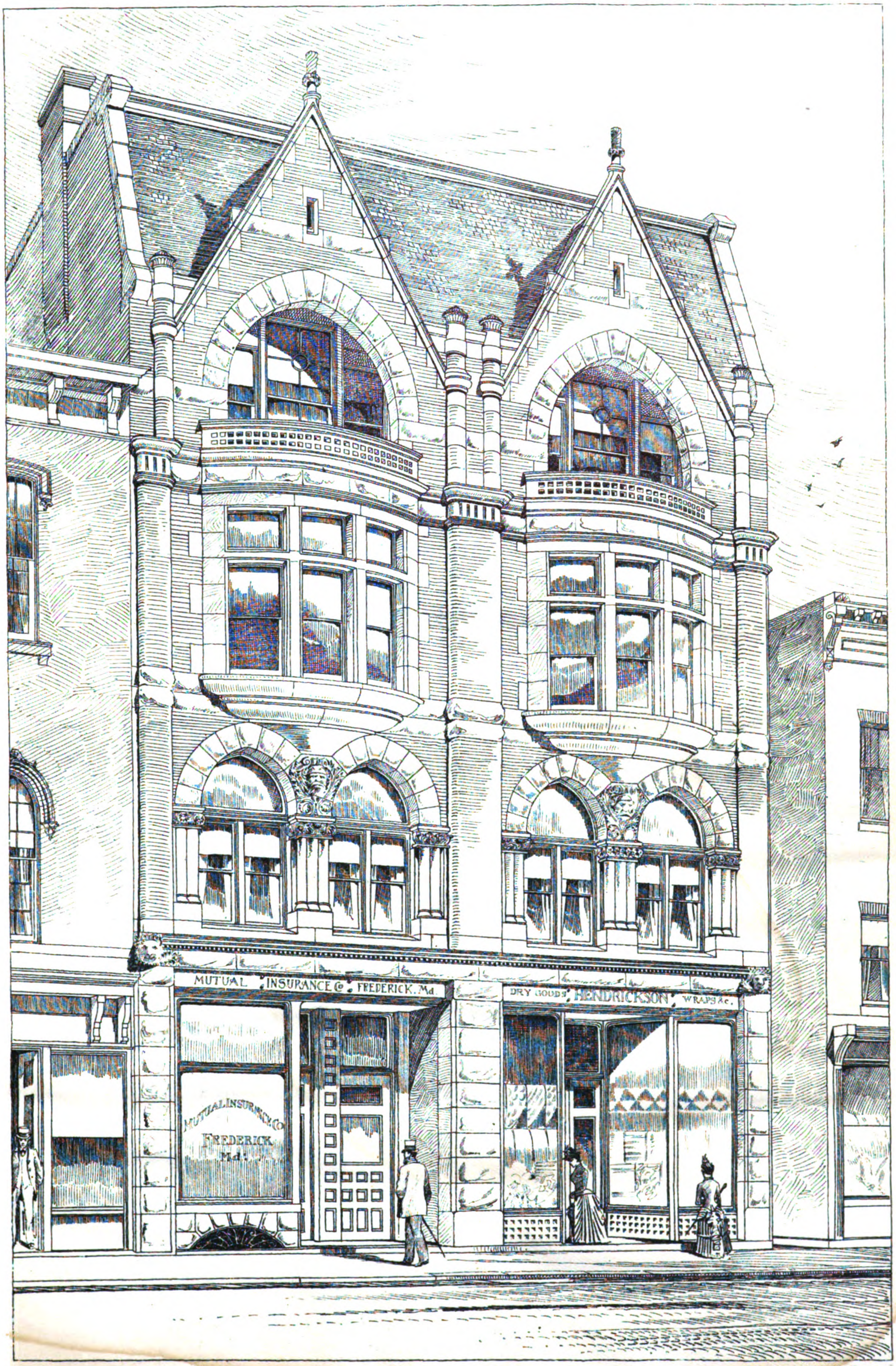

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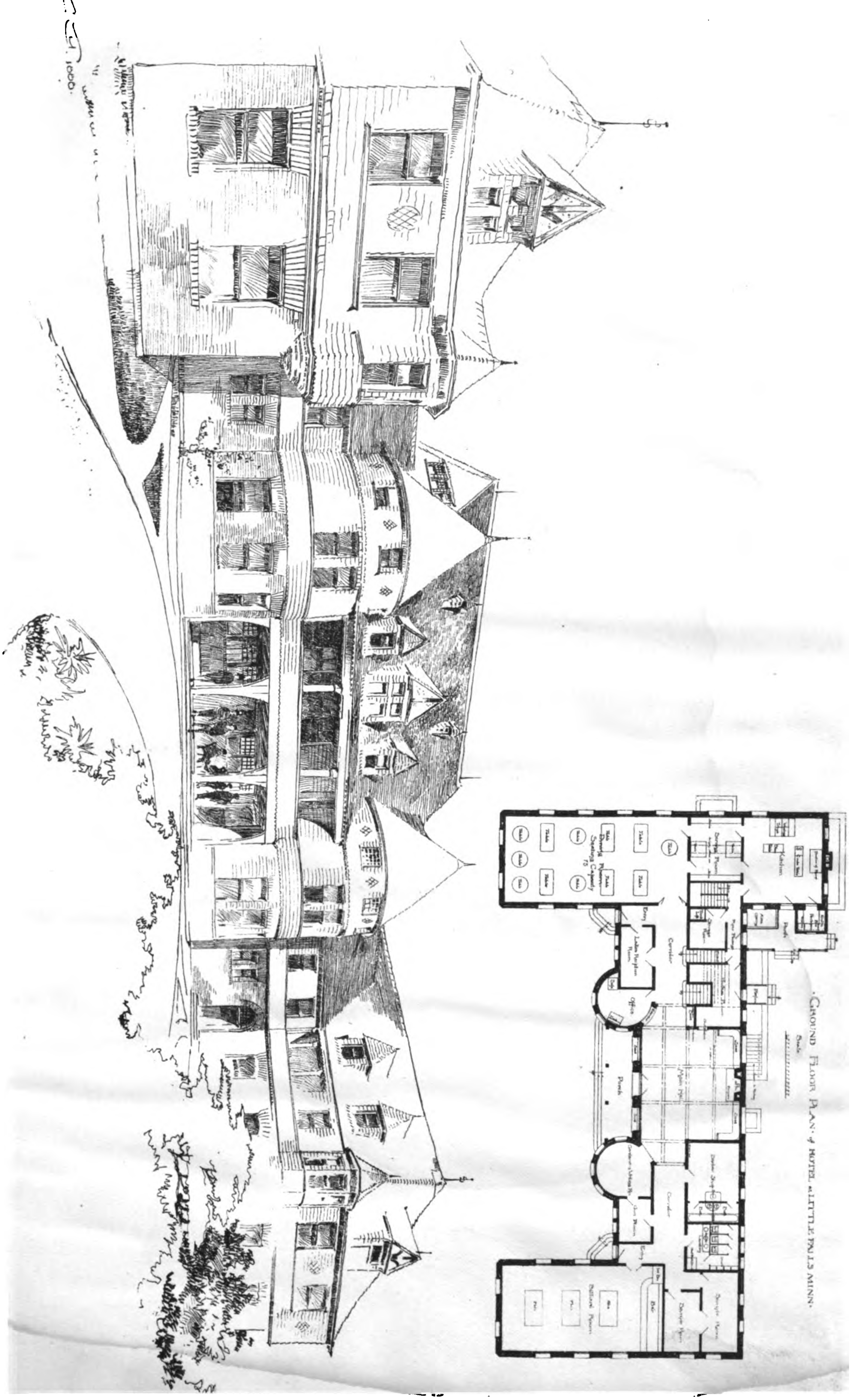

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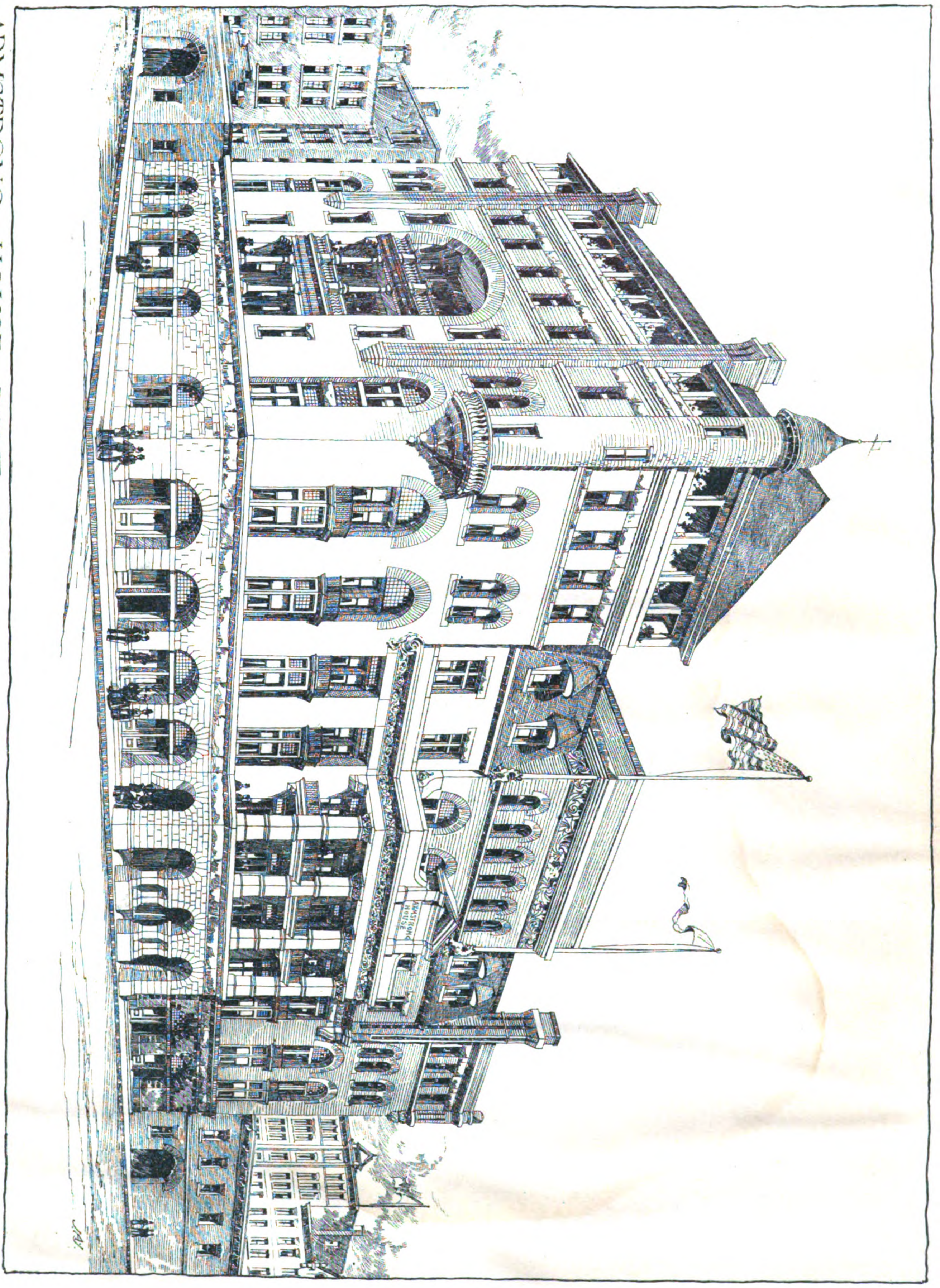

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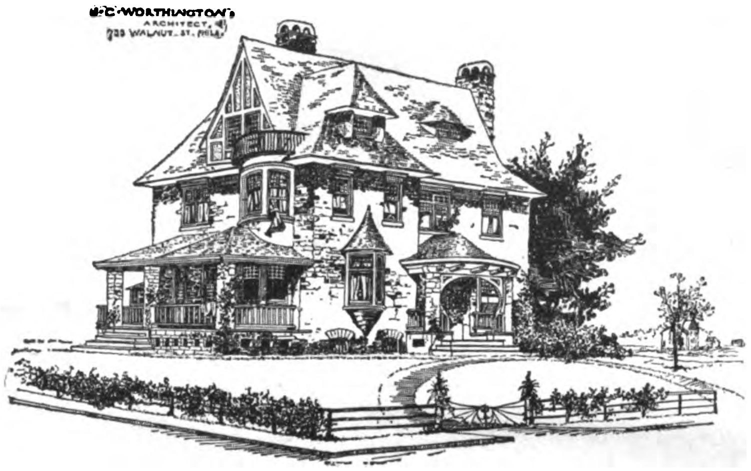

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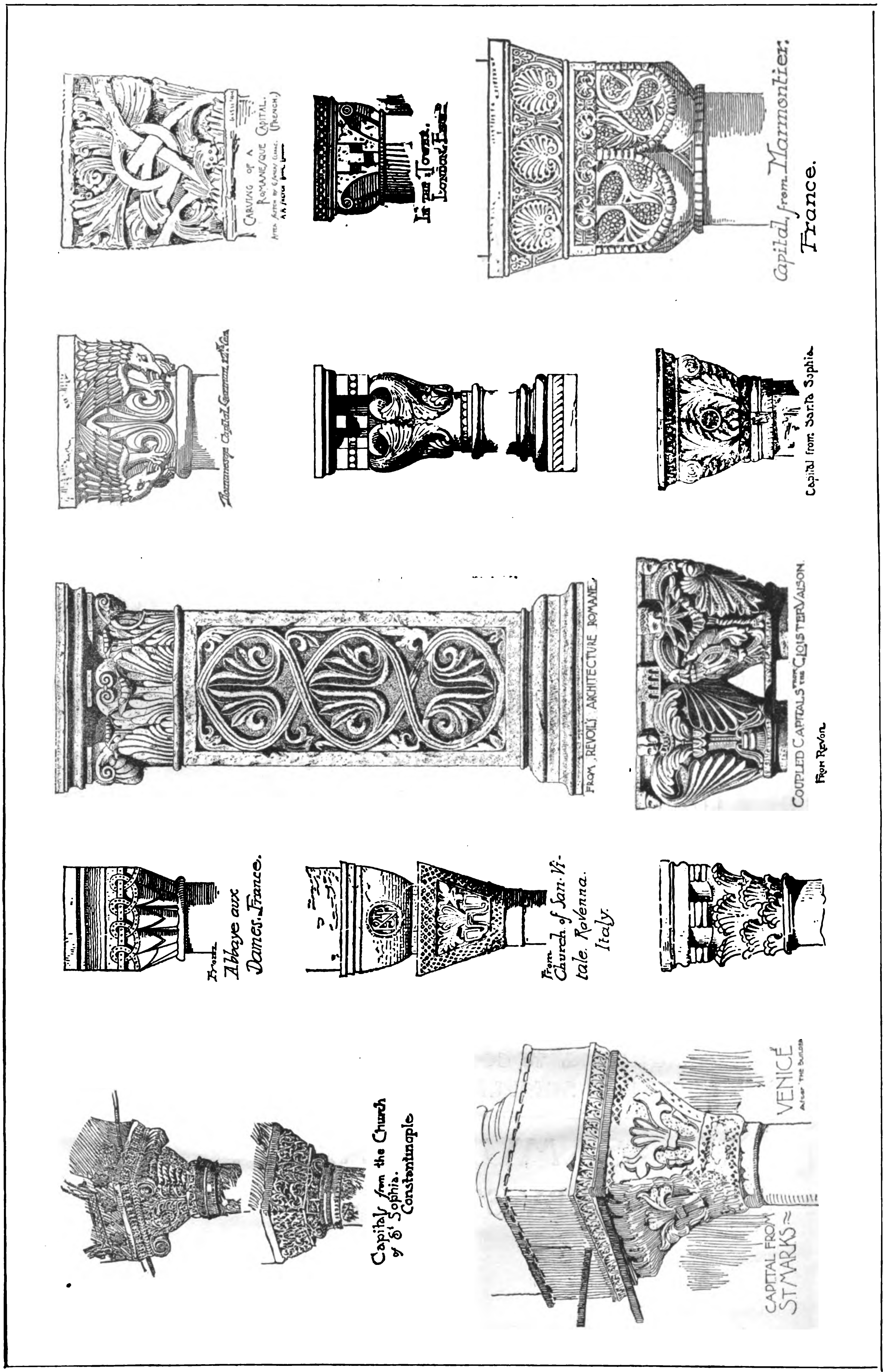

ROMANESQUE AND BYZANTINE CAPITALS.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIV. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 656.

JULY 21, 1888.

Entered at the Post-Office at Boston as second-class matter.

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THE competition for the municipal buildings to be erected in the City Hall Park, New York, has been decided by the award of the third prize, of three thousand dollars, to Mr. B. N. Crawford, of Brooklyn, the fourth prize, of two thousand dollars, to Mr. Appleton P. Clark, of Washington, D. C., and the fifth prize, of one thousand dollars, to Mr. Joseph H. Stark, of New York. Besides these, a special prize of one thousand dollars was given to Messrs. Weston and Tuckerman, of New York, and another of two thousand dollars to Mr. Charles B. Atwood, of New York, whose design had been placed first by the judges, but was technically ruled out for failure to comply with all the requirements. It is understood that Mr. Atwood may be further engaged to revise his design so as to adapt it to a smaller building. The conduct of the competition seems to have been as fair as possible, under the objectionable limitations imposed by the programme, and the Commissioners evidently intended to do their part in a liberal spirit, although in our opinion the withholding of the highest prizes is a thing which can rarely, if ever, be justified. As the law now forbids the erection of the intended structures, it remains to be seen what will be the next step.

A COMMITTEE of the United States House of Representatives has reported favorably a bill for the appropriation of one hundred and fifty thousand dollars to aid Dr. A. de Bousset in constructing an air-ship of a very novel sort. According to the published accounts, the lifting portion of the new balloon is to consist of a cylinder of sheet steel, having a thickness of one-forty-fourth of an inch, or about that of good tin-plate, six hundred and fifty-four feet long, and one hundred and thirty-eight feet in diameter. The ends are to be made conical, and it is hardly necessary to say that the interior is intended to be braced in some way to keep the thin cuticle from collapsing by its own weight. In order to make the structure float in the atmosphere, it is intended, instead of filling it with hydrogen, to exhaust the air contained in it. It is calculated that the cylinder, with its bracing, will weigh about two hundred and sixty thousand pounds, and it will displace a volume of air which at the sea-level, and under the standard conditions, will weigh seven hundred and twenty thousand pounds, so that the net lifting-power, provided a perfect vacuum existed in the interior, would be about four hundred and sixty thousand pounds. As it would, however, be next to impossible to exhaust the air entirely from the cylinder, the actual floating capacity is taken at only one hundred and fifty tons. From the cylinder is to be hung a platform, on which it is intended to mount the machinery for driving the structure through the atmosphere, and for exhausting the air in the cylinder so as to raise or depress it, as well as a one hundred horse-power electric motor, and storage-batteries for supplying the electricity to the motor.

HERE, as it seems to us, is the weak part of the scheme. We cannot see the advantage of using an exhausted cylinder, which would, if the vacuum in it were perfect, have to resist a crushing effort, due to the external pressure of the atmosphere, of nearly thirteen hundred million pounds, or six hundred and fifty thousand tons, when, by filling it with hydrogen, a floating power equal to fourteen-fifteenths that of a perfect vacuum would be obtained, while external pressure would be entirely eliminated, and an immense weight of bracing might be saved, without exposing the cylinder to bursting through any probable expansion of the hydrogen in it; but, even supposing that a tolerable vacuum were maintained, and that the tin cylinder was strong enough not to collapse by atmospheric pressure, the buoyancy obtained seems obviously too small to support the weight intended to be placed on the platform. The platform itself, hanging from a cylinder one hundred and thirty-eight feet wide and six hundred and fifty-four feet long, could not well be less than fifty feet wide and one hundred feet long. This would only be about one-eighth of the horizontal projection of the cylinder, yet a platform, with the suspending rods and ropes, would have to be of very slender construction not to weigh ten pounds per square foot, or fifty tons in all, out of the one hundred and fifty tons which form the limit of floating capacity at the sea-level. The one hundred tons remaining must, therefore, carry storage-batteries, motors, air-pumps, propelling-fans, freight, passengers, crew, cabins and furniture. The motive force to be used is, according to the description, to amount only to one hundred horse-power, a mere bagatelle, as compared with the ten or twelve thousand horse-power allotted to a fast ocean steamer of one tenth the size of this aërial ship, and out of this a portion only is available for propulsion, while the rest is to be employed in exhausting the air from the cylinder, to maintain or increase the vacuum. Even then, however, the burden of the machines alone must, as it seems to us, nearly equal the remaining lifting force. The weight of a power air-pump of large size would be difficult to estimate, but a pump with a cylinder six inches in diameter and two feet long, making one thousand strokes per minute, night and day, would require twenty days to exhaust the cylinder once, if there were no leakage, and would need twenty-five horse-power net, or perhaps forty supplied from the storage-battery, to keep it in motion at that speed toward the end of the exhaust. Such a machine as this, with connections, piping, bed and shafts, could hardly weigh less than five tons, and the motor to operate it would weigh nearly as much more, and two sets of apparatus, which, working together, would exhaust the cylinder, independent of leakage, in ten days, seems to be the smallest number that would have any effect in raising or lowering the structure during an actual trip; so that fifteen tons is not, perhaps, too much to allow for the pumping machinery alone. We have left the propelling apparatus and the storage-battery to provide for. Beginning with the latter, we can perhaps form an approximate notion of the weight which would be required from that of the storage-batteries used to furnish current for electric lights in railway trains. In these, speaking roughly, about a thousand pounds of battery is required to furnish the equivalent of one horse-power in electrical force during a single night, and the battery must then be recharged. At this rate, a storage-battery of the ordinary kind, capable of supplying one hundred horse-power for twenty-four hours, would weigh from fifty to seventy-five tons, and the duration of the trip would be absolutely limited by its capacity. Taking the most favorable view possible, we will reckon the weight of battery, motors and pumps at sixty-five tons, which leaves us thirty-five tons at sea-level for propelling machinery. The latter is to be connected with the exhausting apparatus, the pumps which draw air from the cylinder forcing it out again in such a way as to propel the structure in the desired direction, and a good deal of extra weight in bed-plates and connections would thus be saved, but it could hardly be safe to reckon the propelling apparatus at less than ten tons; leaving twenty-five tons floating capacity, for cabins, furniture, rigging and so on, besides passengers and crew, provided the trip lasted only one day, and that it took place at or near the sea-level. Any attempt to rise above the earth would be accompanied with a rapid diminution of floating-power. The displacement of air by the cylinder being equivalent to a weight of seven hundred and twenty thousand pounds at the sea-level, an ascent to such an elevation that the barometer stood one inch lower than at the sea-level would involve the displacement, at this altitude, of a volume of air weighing one-thirteenth, or twelve tons, less than before, and as the barometer falls, roughly, an inch for each thousand feet of elevation, the air-ship could not ascend to a

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height of two thousand feet without first throwing overboard all its passengers, crew, furniture, fittings, and so on.

ALTHOUGH we cannot see much probability that a metallic cylinder, on any scale, can be so strong as to resist the full external force of the atmosphere, and yet so light, as when wholly or partially exhausted of air, to float in the atmosphere, and lift other objects with it, we are quite ready to commend the idea of appropriating public money for well-directed experiments in the art of aërial navigation. With the exception of the successful, but very limited essays in military ballooning which have been made in France, Italy and Russia, no energetic effort has ever yet been made to solve this great problem. We spend millions of dollars, and lavish enormous power, on steamships to cross the ocean, yet we calmly take our daily walks among clouds of birds, which dash by us through the air at a rate surpassing, in the case of some swallows, a hundred miles an hour, without seriously reflecting whether man cannot follow them in the atmosphere, as he has the fishes in the sea. To our mind, the science of aërostation has hardly paid sufficient attention as yet to the ways in which power can be produced on land, and stored up for voyages through the air. The name of an electrical storage-battery appears to have fascinated recent experimenters, including even Captains Renard and Krebs; yet a storage-battery is a very heavy and inconvenient means for transporting mechanical force, and Dr. de Bousset's scheme for carrying a huge apparatus of the kind, to be employed indirectly by means of motors, exhausting and condensing pumps, in compressing air and then letting it expand in such a direction as to drive the structure forward, suggests the immense economy of weight, and saving in friction, leakage and loss in transmission, to be gained by leaving the storage-battery, motor, exhausting and condensing pumps on the ground, and taking up a supply of air or other gas already condensed into steel or aluminum cylinders, and ready to be liberated, under proper control, in the same way, and with the same propelling effect as the blast produced on the spot by the burdensome condensing-pumps. Moreover, in case this mode of propulsion should prove wasteful and unmanagable, as seems very probable, inventors do not seem to have reflected as they might on the fact that a balloon, unlike a steamship, floats in an ocean of fuel, ready for use by admixture with a small proportion of a substance easily carried. For use in gas-engines, a mixture of nine parts air with one part hydrogen forms a very tolerable material, while the gas engine itself, consisting of cylinder, piston and valves, is a much lighter and more available apparatus than the steam boiler and engine, with accompanying coal-bin, which has been used in France, or the leaden storage-battery and heavy motor which have taken their place in recent experiments. There is a certain machine known as the Parson engine, invented for direct connection to the shaft of a dynamo-electric machine, which consists of four cylinders, placed at right angles with the shaft and connected together. There is no bed-plate and no fly-wheel, but the group of cylinders itself revolves about the shaft which it drives. These machines are said to work easily at the rate of twelve thousand revolutions of the shaft per minute, and the form seems not only admirably adopted for direct attachment to the shaft of a propeller, particularly an aërial one, where high speed would be valuable, but suited to the principles of the gas-engine; and a few thousand feet of hydrogen condensed in aluminum cylinders would supply it for a long time. This arrangement would not provide for raising or lowering the balloon by exhausting or refilling the buoyant part of it, but, as we have seen, so much power and time would be consumed in this work, that it might be better to trust to the position of the shaft of the propeller for overcoming whatever grades might have to be ascended or descended after starting on an aërial trip.

THE most readily available, however, of all means of locomotion in the air, is that which serves the eagle, the sea-gull and the swallow. So far as we can understand their flight, they progress by simply raising themselves in the air, either by taking advantage of a current, or flapping their wings, and then allowing themselves to slide down again, at an angle which they know how to regulate perfectly by means of their wings and tail. To imitate this with Dr. de Bousset's balloon, we should have to fit it with wings on each side, whose inclination could be nicely regulated. Then, leaving behind all other machinery, we should ascend, with exhausted cylinder, high into the air. By a pull of the valve, air would then be freely admitted to the cylinder, and in a moment we should have, not a structure of uncertain buoyancy, feebly pushing itself along with little puffs of condensed air, but a mass weighing, with its cargo, seven hundred and twenty thousand pounds, drawn downward by the tremendous force of gravitation, resisted, or rather, directed, by the outspread wings. It is not easy to reckon the exact amount of this force, but supposing gravitation to be pulling the balloon toward the earth with a vigor which would cause it to descend, if the tendency were unresisted, at the rate of sixteen feet per second, we may fairly say that the whole mass tends to fall vertically with a force of twenty-one thousand horse-power. This, then, is the power that the navigator of such a balloon, relieved of its burden of machinery and storage-batteries, may command at a touch, in place of the paltry twenty or thirty horse-power which Dr. de Bousset must carry such a cargo to secure. It is true that the effect of gravitation in driving the balloon forward would diminish with the angle which its course made with the earth's surface, but not in a direct ratio; and it may perhaps be safe to say that a balloon like this, rising first in New York to a height of five miles, would travel thence to Liverpool by gravitation with an average force greater than that which Dr. de Bousset's storage-battery would yield him for a single day.

M. CACHEUX, the hero, we might almost call him, of the most thoughtful and carefully studied attempts at improving the dwellings of the laboring classes that have, perhaps ever been made, presented a paper at the recent Congress of learned societies in Paris, on the methods of guarding against accidents, which is reported in *Le Génie Civil.* Few people realize how many accidents occur every year. In France about thirteen thousand persons are killed by accident every year, and the number of those maimed or otherwise injured must be far greater. In Great Britain, during the last twenty years, there have been two hundred and twenty-nine thousand fatal accidents, twenty thousand persons having been killed on railways, thirty thousand at sea, nineteen thousand in mines, and one hundred and sixty thousand by casualties of other kinds. Against this great loss of life M. Cacheux, like a true engineer, believes that science can provide safe-guards. Although cyclones and earthquakes will always have their victims, the casualties due to inundations, which were once very numerous in France and England, and are so still in less civilized countries, have been greatly reduced by engineering skill, while by the same science, the diseases incident to unfavorable topography have been much ameliorated. In industrial employments there are still far too many avoidable accidents. In Germany, which seems to be rather behind the age in respect to mechanical improvements, the annual mortality from accidents among working people varies from twenty-one to thirty-four in ten thousand, while the average in France is only twenty-two. As an offset to this, the German law compels masters and workmen to pay for insurance against accidents, but, according to M. Cacheux, this compulsory accident insurance is very costly, two-thirds of the premiums being absorbed by expenses of management. Next to moving machinery, fires are responsible for perhaps more casualities in France than any other cause. We are accustomed to think the French houses models of solid construction in comparison with ours; but M. Cacheux says that in Germany the use of combustible materials in dwelling-houses is absolutely forbidden, even wooden stair-cases being prohibited; and he commends the American system of requiring fire-escapes to be placed on hotels and tenement-houses. As to the means of extinguishing fires, great differences prevail in different countries. Although the German houses are so incombustible, much attention is paid to fire service. In Wurtemberg every male citizen must belong to a fire company and be ready for service when called upon; while in Vienna a great volunteer company not only provides service for the fire engines, but furnishes a corps of gymnasts, mostly students, to rescue persons from the burning buildings, ambulances to carry them, if injured, to the hospitals, and physicians to attend them, and flying kitchens, which, after an extensive conflagation, appear upon the spot with provisions, ready to cook and serve to the unfortunate people whose domestic arrangements may have been broken up by the fire. The same company looks after persons seized with contagious disorders, thousands of whom are taken to the hospitals in special ambulances, conducted by paid and experienced men.

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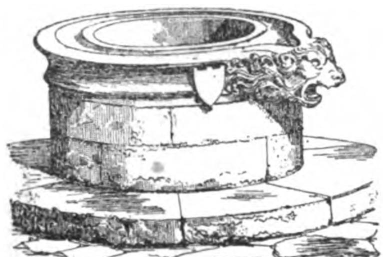
THE CONGRESSIONAL LIBRARY BUILDING.



AS several correspondents have asked us for more information concerning the threatened action of Congress, in regard to the Congressional Library building, we give below the portions of the debate in Congress which have most real bearing on the question:

SESSION OF JUNE 19.

The Clerk read as follows:

Building for the Library of Congress: For continuing, under the control and direction of the Secretary of the Interior, the construction of the building for the Library of Congress, including the appointment of all persons employed in connection therewith at the rates of compensation, as follows: architect, $5,000; assistant architect, $3,000; superintendent of construction, $4,000; one chief clerk, who shall act as disbursing agent, and who shall give bond in such sum as the Secretary of the Interior may direct, $2,200; and the service of skilled draughtsmen, civil engineers, computers, accountants, copyists, and such other services as the Secretary of the Interior may deem necessary and specially order, may be employed in the office of the architect and superintendent of construction, together with such mechanics and laborers as may be necessary to carry into effect the appropriation herein made for construction of said Library building and to be paid from such appropriation; for the construction of the western front of the building, the reading-room, and the book repositories connected therewith, $500,000; in all, $514,200; and the Secretary of the Interior is hereby authorized to contract for any portion of the said western front of the building, reading-room, and book repositories.

Mr. Holman. — I move to strike out the last word in order to say a few words on this provision of the bill. The inquiries which have been made lately into the subject of this Library building tend to raise a doubt as to whether upon the present plan the work should proceed. I hold in my hand the report made to this House by the House Committee on the Congressional Library at the first session of the last Congress, and I ask the Clerk to read the paragraph which I have marked.

The Clerk read as follows:

The measurements of these architects, together with the figures of the steady growth of the collections reported by the Librarian, demonstrated that no possible enlargement of the Capitol which would be agreed to as feasible could possibly afford accommodation for more than a few years' increase, after which we should be confronted at last by the necessity of a separate building, after incurring all the cost of building on to the Capitol a costly annex of stone and iron, unfitted for any other purpose. Any enlargement of the Capitol which would accommodate the Library even as it stands, with room to arrange it, would cost much more than a separate building, because it must necessarily be constructed in the same costly style, with carved Corinthian architecture. Mr. Walter, the former Architect of the Capitol, estimated the cost of an extension of the west front at $4,500,000. The present Architect, Mr. Clark, estimates it to cost $4,200,000, while the plan of a building adopted by the committee is to cost only $2,323,600.

I wish to call attention to the fact that according to the report of the committee to the House the cost of the building was to be $2,323,600. There were two projects before Congress. One was the enlargement of the present Library; and the argument in favor of that project was that for accomplishing the purpose of a Congressional Library, the Library must be easily accessible to the two Houses of Congress.

For this reason the Library had remained in its present location, having been enlarged from time to time and greatly improved within the last twenty-five years, and made as nearly as possible fireproof, an expenditure altogether, I think, of $750,000 having been made upon it with the view of the Library being retained in its present location for the convenience of the two Houses of Congress. In opposition to the plan of enlarging the Library in its existing location was the plan of having a separate Library building at some point away from the Capitol.

The report stated the fact that one architect had estimated the cost of the enlargement of the old Library rooms at $4,500,000; that Mr. Clark, the Architect of the Capitol, had estimated the cost of $4,200,000. The report then went on to say that the plan of a separate building was more economical, because on the plan named in the bill then pending the cost would be $2,323,600. I now ask the Clerk to read from the volume I have sent to the desk the paragraph to which I have referred from the remarks of the Hon. Mr. Singleton, to show exactly the appropriation which it was stated would be required for the completion of the building as proposed in the bill.

The Clerk read as follows:

The appropriations asked for will be $500,000 to begin the work, $1,000,000 at the next session to continue it, and $823,600 at the succeeding session to complete it. This, of course, does not embrace the purchase of a site. It is confidently believed that these sums will finish the building so far as needed at present and for many years to come; and no further outlay need be made by the Government, utilizing, as before stated, the fees from the copyright system to put in shelving, etc., to meet the growing wants of the Library.

Mr. Holman. — The three successive appropriations stated in the remarks of Mr. Singleton, as just read, amounted to $2,323,600. That estimate, I admit, did not embrace the cost of the site, for which $550,000 was appropriated. The site ultimately cost $580,000 which, so far as I am able to learn, was reasonable enough. I do not know that there is any ground of complaint in that regard, for there was purchased for that sum an immense tract of land, over 2 acres, I think, in the heart of the city, and with a vast body of solid substantial buildings.

The question now is, what ought to be done in the present state of things? It is now known that the lowest estimate for this building is $7,000,000. The House some months ago directed a committee of its number to inquire into these matters, and some inquiries have been made. The committee finds that the lowest sum named by any architect as the probable cost of this building, instead of being $2,323,600, is $7,000,000.

Mr. Weaver. — What is the highest estimate?

Mr. Randall. — About $12,000,000.

Mr. Holman. — The lowest estimate is $7,000,000 for a building which is to be much larger than the great structure known as the State, War and Navy Department building; and this is to accommodate a library containing a collection of books which, I believe, is valued at $750,000.

. . . .

Mr. Chairman, I do not wish to throw the slightest reflection upon the gentleman from Mississippi, Mr. Singleton, who reported this bill to the House originally. The bill was frequently before the House previous to that time. The gentlemen who reported the bill certainly acted in good faith, believing the statements made in his report and in the speech which he made to the House. He was authorized by the best information which could be obtained on the the subject. And I desire to disclaim at once any thought of casting the slightest imputation on his motive. He is not now a member of House, but I simply call the attention of the committee to the fact that the House of Representatives was deceived or misled in reference to this matter, whether such was the intention or not.

There can be no question, Mr. Chairman, that this House was deceived in the passage of the bill in reference to this Congressional Library. That measure had been defeated whenever brought in, and the large expenditure now shown to be inevitable was suggested as the probable cost, for the original sum suggested was $3,000,000, and so long as it remained at that sum it could not command a majority of the House. Whenever it was attempted to be passed on that basis it always failed. It came in the Forty-seventh Congress, and again in the Forty-eighth Congress, and finally it was brought before the Forty-ninth Congress, with the report to which I have called attention.

We were told then that here is a structure which can be cheaper than you can enlarge the present Library; for almost half what the enlargement of the present Library will cost. On that statement, as I think it was understood by the House, on the motion to suspend the rules and pass the bill on a yea-and-nay vote, there were yeas 159, nays, 68. So the House passed the bill which had repeatedly before that time passed the Senate but had always been defeated, or at least been postponed, in the House.

I take it for granted that the gentlemen were deceived. The House was certainly deceived as to what kind of a measure it was entering upon. It is not the question now whether the House would enter upon the building of a Library building to cost $7,000,000 or more; that is not the question. The question is, whether the House of Representatives can consent that legislation shall stand which has been the result of clear misapprehension.

I do not care whether fraud was intended by any person or whether deception was intended by any person; but the important fact is that in the passage of the bill the House itself acted under a misapprehension of the facts. They were assured the building would cost two or three millions of dollars. They were assured it would cost less than the enlargement of the present Library. Instead of that it is now discovered that it would cost vastly more than enlarging the present library rooms.

We might pass over a difference of half a million or a million of dollars; but when the difference amounts to $5,000,000, or more, Congress should pause before they carry on a work which had been authorized under a clear misapprehension of the facts, no matter whether there was an intention on the part of any one to create a misapprehension or not on the part of Congress.

. . . .

But Mr. Chairman, I want to suggest this — [Mr. Holman here proposed that a portion of the new building should be used by the Supreme Court of the United States.]

I wish to add further, sir, that this new Library building movement has been largely from the beginning under the control of the Senate. The Senate organized the movement some years ago, back as far perhaps as the Forty-sixth or Forty-seventh Congress, and a joint committee on additional accommodations for the public Library was appointed. It remained a joint committee until the beginning of the Forty-eighth Congress, when the House declined to appoint

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its part of the committee. But it still remained as a Senate committee; and under the auspices of the Senate almost exclusively this whole measure has been carried out from beginning. . . .

The measure was prompted by the Senate, was inaugurated by the Senate, and was passed over and over again by the Senate, and always objected to by the House until the House was informed of the comparatively moderate sum necessary to carry the measure into effect, the plan as it came from the Senate involving practically as was alleged but a small expenditure, compared with the original estimate of $8,000,000, and greatly less than the enlargement of the old Library rooms in the Capitol.

On that argument that bill was passed. The question is whether this House will feel it consistent with the duty that Congress owes to the country to carry out a measure of legislation that was the result of misapprehension when the real facts are discovered early enough to prevent any material loss or embarrassment.

Mr. Hooker. — I would like to ask whether there has not been a plan adopted.

Mr. Randall. — The plan was incorporated in the act.

Mr. Hooker. — In the act that passed both Houses? Do you propose to suspend the work and vary that plan now?

Mr. Randall. — The same power that made the act can change it.

Mr. Hooker. — After you have made your contracts.

Mr. Holman. — Very few contracts have been made.

Mr. Hooker. — You have adopted a plan.

Mr. Randall. — Yes; but we can change it by law.

. . . .

Mr. Ryan was recognized.

Mr. Randall. — If the gentlemen will yield to me, I desire to move that the committee now rise.

Mr. Ryan. — I will yield for that purpose.

Mr. Randall. — Mr. Chairman, I move that the committee do now rise.

The motion was agreed to.

Session of June 20.

Mr. Nutting. — Mr. Chairman, I had the honor to be one of the members of the Committee on the Library in the Forty-eighth Congress. The whole subject of the erection of a suitable Library building for the United States of America was investigated by me. . . .

The gentleman from Indiana [Mr. Holman] said yesterday he had been deceived in regard to the amount of money which was needed to finish the new Library building.

That may be true so far as the gentleman is concerned. I was not deceived, at any rate, and if the gentleman was, it was perhaps his fault. I examined this subject with the assistance of Mr. Smithmeyer, with the assistance of the Librarian of Congress, and with the assistance of all the reports which had been made by committees of the Senate and House prior to that time in regard to the cost of the Library building as it was to be, and I had the plans before me; and I say here, Mr. Chairman, that the debates in the Forty-ninth Congress will show, I believe, that when the act providing for this building was passed the estimates were not $2,300,000 for the building complete, but $2,300,000 for the building as shown by the plan I hold in my hand; the front part and the central part of the building, called the reading-room. I say that at no time and in no place will it be found that any person authorized by any committee or upon any committee or any architect employed for the purpose ever stated that this building would cost $2,300,000 and no more, complete.

. . . .

Now, Mr. Chairman, you very well know that whenever an act has been passed for the erection of a public building, post-office, court-house, or custom-house, or for any other public purposes, even though the act itself provides that the building should not cost more than $100,000, or perchance $150,000 or $200,000, almost universally that building has cost from 33 to 50 and sometimes even 100 per cent more than the estimate and more than the bill provided for. You know, Mr. Chairman, that over and over again this Congress and other Congresses have passed acts increasing the amounts from that which was first mentioned in the bill for the erection of the building; sometimes doubling the amount. If this estimate is now placed at $4,900,000, and the building should cost $7,000,000, there would be nothing unusual in the fact.

Now, Mr. Chairman, I do desire here to emphasize in one other little statement my idea of resistance to an attempt to lay hands on this Capitol to make additional accommodations for the Library.

What these gentlemen who are attacking this plan want is to break it up, and then come to this Capitol and erect a building upon the western or the eastern side of it for the accommodation of the Library. As soon as you give them a foothold that will be and is the plan. Why, Mr. Chairman, in one sense the Capitol building itself illustrates and emphasizes the strength of this Government. This may be a sentimental view, sir, but sentiment sometimes comes very near to principle. . . .

Mr. Hooker. — I wish that the gentleman before he sits down would tell us what was the character and the cost of the edifice provided for in the act passed by the Forty-ninth Congress.

Mr. Nutting. — I will answer the gentleman's question and then proceed with my argument. I have here a design of the building which I send to the gentleman that he may examine it. The building which the act of the Forty-ninth Congress was passed to erect was intended to cover 2.9 acres, and it was designed to accommodate when completed ten million volumes and more. We have now not quite one million volumes, and our library stands fifth in the whole world so far as its extent is concerned. The $2,300,000 which has been mentioned as the estimated cost of the buildings was simply the amount required to finish the front part of the building — the reading-room and the front part of the building. It did not cover and never asserted to cover cost of the building when complete and finished. In answer to the gentleman from Mississippi I will say that the part of the building which the $2,300,000 was intended to pay for was this portion here [illustrating by diagram], and not even to finish all the rooms in that. This other portion [illustrating] was left entirely out. In the reports of the committees of the Forty-sixth and Forty-seventh Congress it was asserted that the whole building would cost $5,000,000. The reports — three or four of them — show that the estimates were about that sum. The estimate of $2,300,000, to which the gentleman from Indiana [Mr. Holman] has referred, was simply for about half the building, and even then it was not intended to finish on the inside. . . .

Mr. Ryan. — I desire to offer a substitute for the pending paragraph.

The clerk read as follows:

That the Committees on Public Buildings and Grounds of the Senate and House of Representatives, acting conjointly, shall, within thirty days after the passage of this act, invite from eminent architects, not exceeding five in number, designs and general specifications for a building for the Library of Congress, to be erected on the site purchased for that purpose in the city of Washington, the cost of the building not to exceed $3,000,000; and the sum of $10,000 is hereby appropriated, to be expended under the direction of the above-named committees, to pay for the said designs and general specifications. The said committee shall jointly report to Congress its action in the premises on or before the 20th day of December, 1888. That the work now in progress on the building of the Library of Congress shall be suspended and the commission authorized by act of Congress approved April 15, 1886, be, and the same is hereby, dissolved. That the property purchased for a site for the Library of Congress, including buildings thereon, together with all plans, records, and other property of the United States connected with the building for said Library of Congress, be, and the same is hereby, transferred to the care and custody of the Interior Department; the expenses of such care and custody shall be paid out of any money already appropriated for the construction of the building for the Library of Congress.

Mr. Holman. — Mr. Chairman, I am anxious that at this time at least there shall be no misapprehension of what is being done or what has been done. In order to avoid any possible mistake as to the statements which induced the House to pass the Library bill, I desire that enough of the act authorizing the construction of the Congressional Library building be read to show exactly the plan intended to be adopted.

The Clerk read as follows from page 12 of the Acts of the First Session Forty-ninth Congress:

The construction of said building substantially according to the plan submitted to the Joint Select Committee on Additional Accommodations for the Library of Congress by John L. Smithmeyer, in the Italian style of architecture, with such modifications as may be found necessary or advantageous without materially increasing the cost of the building.

Mr. Holman. — I ask the Clerk to read also a statement I have marked in the report of the Committee on the Library at the first session of the Forty-ninth Congress in support of the Library bill. The first and last of the three paragraphs which I send up cover the entire ground, first, as to the plan, and secondly, as to the expense of the whole structure when absolutely completed. I ask the clerk to read those three paragraphs.

The Clerk read as follows:

It remains to consider briefly the plan for a Library building and the site proposed by the bill which has been adopted by your committee. It proposes a building of ample dimensions, to hold ultimately three million books, measuring 450 feet by 300, and covering about 2.9 acres of ground. The style of architecture is of the Italian renaissance order, carefully and economically adapted in all its parts to the purpose of a Government Library, and with interior arrangements approved by the Librarian. The building is designed to be of stone on the exterior and of iron and concrete in the interior, entirely fireproof in all its parts. It is a pleasing and sufficiently ornate edifice, without extravagance, and will be entirely in harmony with the Capitol. That this proposed building is none too large for the destined wants of the collection is proven by a few figures which follow.

The area covered by the building of the British Museum is 5 acres; area of the National Library of France, at Paris, 4 1-4 acres; area of the Capitol building 3 1-2 acres; area of the proposed National Library, 2.9 acres.

The proposed building, as stated, will contain 3,000,000 volumes, with suitable economy of storage. It is not designed to fit up the whole interior at once with iron shelving, but to introduce it gradually, finishing off the central portions, rotunda, and connecting rooms, and the entire exterior structure. The chief element of cost is in the iron alcoves of the interior, and in a building so extensive these may be finished in successive years, as wanted for the increase of books.

The most carefully guarded estimates of cost contemplate an expenditure of only $500,000 the first year, about $1,000,000 the second, and

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$800,000 the third, which will complete the building for occupancy in all its parts, sufficient for shelving one million books, and leaving space for the gradual introduction of additional iron alcoves in the coming fifty years, the ultimate gross cost of which will not exceed $700,000, or an average of less than $14,000 a year. When it is considered that the copyright fees paid into the Treasury amount to over $20,000 a year, while the pecuniary value of copyright publications received annually is very much greater than this the expenditure will appear moderate in comparison with the great resulting benefits and the national importance of the work.

I wish to call the attention of my friend from New York [Mr. Nutting] to this report as read. It states the cost of the exterior of the building entire at $2,300,000. It states the entire cost of the alcoves for books, as required for the next fifty years, at $700,000, making $3,000,000 for the completed building as it would stand fifty years hence.

. . . .

Mr. Nutting. — In the report for the Forty-sixth Congress you will find this wording:

It is estimated that the entire building will hold something over 10,185,000 volumes, exclusive of the wall-room in the corridors, which may, in case of necessity, be lined with book-cases.

The central building will contain about 1,280,000 volumes.

The estimated cost of the entire structure is within five million dollars ($4,924,343).

The cost of the central portion, with the two connecting wings for offices of administration, is estimated to be within one and a half million ($1,443,800).

In 1882, the same statement was made precisely.

Mr. Sawyer. — My idea, Mr. Chairman, is this: It is not to the building I object, and I shall not object if it costs $7,000,000, but I do object to any architect or any committee which will present a report to this House and ask us to put up a building saying it will not cost but three or four millions of dollars, and then at the very next Congress give us notice it will cost from ten to twelve millions of dollars. It is not doing the fair thing.

. . . .

Mr. McCreary. — Mr. Chairman, I am in favor of a building for the Library of Congress that will meet all reasonable demands and be commensurate with the dignity, the wealth, and the greatness of this Republic; but when we start out to construct that building we should proceed in a business-like manner. We should know in the construction of a public building for the United States what each one of us would wish to know when we start to build an edifice for ourselves — we should know what the cost will be.

I remember well that in the Forty-ninth Congress, when the bill was introduced providing for the construction of a Congressional Library building, the chairman of the committee was asked what the cost would be. The chairman said on that occasion the appropriation asked for would be $500,000 to begin the work, $1,000,000 at the next season, and $823,600 at the succeeding session to complete it; which made the sum of $2,323,600. This is what the chairman of the committee stated when he reported the bill to the House. There was a report filed at the same time by the Library Committee, in which it was stated that the most carefully guarded estimates, contemplated an expenditure of only $500,000 the first year, $1,000,000 the second, and $800,000 the third, which would complete the building for occupancy in all its parts sufficient for shelving one million of books, leaving a space for additional iron alcoves, the whole cost of which it was estimated would not be over $700,000. It appears, therefore, that by the statement of the chairman of the committee and by the report of the committee this building was to cost only $2,323,600.

Now, what is the situation to-day. We have bought the site for the building at a cost of $585,000, and we have expended about $200,000 up to this time, and we are told that this edifice is to cost between $7,000,000 and $12,000,000. That is quite a wide margin of difference, and I ask if that is a business-like way of proceeding? Is that the way we should proceed as members of Congress of the United States in dealing with a public trust?

. . . .

Mr. Hooker. — I do not know how far members of this House may have been imposed upon, to use the language of the gentleman from Indiana [Mr. Holman] on yesterday. I will state my understanding, and if I am wrong I would like to be corrected. I care nothing about who is the architect of this building. I would like to have a suitable building constructed, suitable not only in its interior arrangement, but a building whose exterior finish shall be such as to challenge the admiration of every citizen whose eye rests upon it. . . .

If I am wrong I would like to be informed by some gentleman who was here in the Forty-ninth Congress. I understand that the little plan which I hold in my hand, and which I saw for the first time this morning, is the plan which was presented for the consideration of this House and put on exhibition at the Clerk's desk for the inspection of members at the time the House passed the bill in the Forty-ninth Congress.

I understand this (exhibiting another plan) is the extended plan, comprising the whole. I understand the plan which was referred to by my friend from Kentucky, Governor McCreary, which was to cost only $2,300,000 for the erection of the building and $700,000 for the completion of the alcoves in the interior, making the actual cost $3,000,000, was the first plan; and nobody estimates now it will cost any more than that to erect this portion of the building. But if you extend it as it is represented in the second plan, so as to occupy the whole ground instead of simply a part, then the cost will be increased. You may go on and add to it as the occasion requires. The purchase of the ground at a cost of nearly $600,000 was probably made looking to the idea that the Government should purchase a site sufficiently large for the erection of a building to be extended as the necessities of the Government might require in future days and in future years. Therefore they made the purchase of the large site, and have laid the foundation; but, as I understand, they only propose to construct at present a building the aggregate cost of which will be about $3,000,000.

Mr. Ryan. — So far as I am concerned personally I am in favor of the construction of a Library building that shall be suitable for all the purposes of our government. I have always favored propositions for the construction of a Library building. But my recollection is not at fault when I say we were invited in the Forty-eighth Congress to vote for a building complete in all respects, except some of the iron alcoves, for the sum of $2,300,000.

It was no such proposition as is indicated by the gentleman from Mississippi [Mr. Hooker]; no such proposition as is indicated by the gentleman from New York [Mr. Nutting]. It was a proposition to complete the building, the plans of which were before us at the time, for the sum of $2,300,000. In support of what I say, I call special attention to the language of the report of the committee that reported the bill. Mark the language:

It is not designed to fit up the whole interior at once with iron shelving, but to introduce it gradually, finishing off the central portions of the rotunda, the connecting rooms, and the entire exterior structure.

The "entire exterior structure" — mark the language.

This report goes on to say:

The chief element of cost is in the iron alcoves of the interior, and in a building so extensive this may be finished in successive years as wanted for the increase of books. The most carefully guarded estimates of cost contemplate an expenditnre of only $500,000 the first year, about $1,000,000 the second year, and $800,000 the third, which will complete the building for occupancy in all its parts, sufficient for shelving 1,000,000 books, and leaving space for the gradual introduction of additional iron alcoves in the coming fifty years, the ultimate gross cost of which will not exceed $700,000, or an average of less than $14,000 a year.

Mr. Milliken. — I want to ask the gentleman this question: Do you expect to get a building 20 per cent larger than the War, State and Navy Department building for that amount of money? Do you deem it possible?

Mr. Ryan. — When I voted for the bill I relied upon the committee, the official organ of this House. They declared what the cost would be upon "the most carefully guarded estimates." They presented to us here at that time the plan and specifications accompanied by those estimates.

Mr. Buchanan. — And did not that plan include the whole quadrangle?

Mr. Ryan. — The whole. Now, what will be the cost of this building? A few days ago the chairman of the present commission, the honorable Secretary of the Interior, an accomplished officer and a thorough business man, came before the Committee on Appropriations and said:

"Gentlemen, I will not permit you to be deceived any longer in regard to the cost of this building. It can not cost less than $10,000,000, and may cost more."

What I want to say is this. I doubt not that the committee acted in good faith. The honorable chairman of that committee, Mr. Singleton, of Mississippi, is the very soul of honor. He would no more mislead this House than he would commit the crime of arson. He is as high above that conduct as it is possible for humanity to be. But somebody misled him; somebody misled the gentleman from New York; somebody grossly misled that committee, and through them the people's representatives on the floor of this House, and in that way $8,000,000 of the people's money will be taken from the Treasury by deception, if we carry out this scheme.

Mr. Oates. — If the gentleman will permit me to interrupt him a moment, I quite agree with his statement of what took place. I remember the facts precisely as he does, and I voted for the bill upon that hypothesis; but may not this building be utilized as a good investment by devoting a part of it to the purposes of the Supreme Court of the United States and another part to the use of the Department of Justice?

Mr. Ryan. — I am told by the Architect of the Capitol that the work can be suspended without any loss whatever, whether the specifications shall embrace a combination of a Supreme Court room and the Library or whether the whole be devoted to the Library.

Mr. Milliken. — Does not the gentleman know that there is a contention between the Architect of the Capitol and the architect of the building, and that therefore the information which he cites may not be reliable?

Mr. Ryan. — I do not know about that; I do not care to inquire into those details. But I do know, and so does every sensible man, that it is highly probable that the Committee on the Library relied wholly on the architect whose plans and specifications they adopted.

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Now one or two things is morally certain. The architect who makes an error of $8,000,000 on a two-million building is either incompetent or dishonest. He can take either horn of the dilemma he pleases.

Mr. Milliken. — But has he made the error?

Mr. Ryan. — Certainly he has made it.

Mr. Milliken. — That is disputed very seriously.

Mr. Ryan. — He has made the error if the building will cost ten millions, and, Mr. Chairman, if the honorable Secretary of the Interior can at this distance of time see a cost of $10,000,000 for that building, I have no doubt that it will cost at least $13,000,000, judging from past experience in public-building construction.

Nobody denies now that the cost will be at least seven or eight million dollars. That is the minimum estimate of even the parties interested. This architect, according to the admission on all sides, must have been mistaken to the extent of at least $5,000,000 on a building which was estimated to cost a little over $2,000,000.

Mr. Milliken. — But the plan has been changed; and the building is to be larger than at first contemplated.

Mr. Ryan. — No authority to change the plan was given. The plan was provided for by law. The law declared that the building should be built in accordance with that plan. There was no warrant whatever for departing from the plan.

Now, the question is simply this: Whether, because the work has been begun and although it is ascertained that a suspension of the work can be had without loss, the people's representatives shall stand here coerced to ratify a deception and a fraud. So far as my vote is concerned, while I might be willing to vote $8,000,000 for such a building, while I might be willing to vote even more if I were satisfied of the propriety of the measure, I will not stand here and ratify a fraud and deception upon the people of the country to the amount of over $8,000,000.

Mr. Hooker. — Who is it that has authorized an extension of the building beyond the plan agreed upon originally?

Mr. Ryan. — I do not know that it has been extended.

Mr. Hooker. — Has the architect done it?

Mr. Ryan. — I do not know that anybody has done it.

Mr. Hooker. — Then why is the gentleman charging him with it?

Mr. Ryan. — I am not charging him with it; but I am saying that the plan and specifications upon which Congress acted were based upon an estimated cost of $2,300,000 for a building which is now ascertained will cost over $10,000,000.

Mr. Hooker. — Who ascertains it?

Mr. Ryan. — It is admitted that it will not cost less than $7,000,000.

Mr. Hooker. — Who admits it?

Mr. Ryan. — The Secretary of the Interior.

Mr. Hooker. — We want somebody who is an architect to speak about a matter of that kind.

Mr. Milliken. — Have not all those plans and specifications been changed?

Mr. Ryan. — I do not know whether they have or not. The gentleman has asked me that question repeatedly. I do not know how they could be changed. The law provides that the building shall be constructed substantially in accordance with the plans which were before the House at that time.

Mr. Milliken. — I do not understand how you were deceived; because if a man had never seen an architect in his life, his common sense should have told him that a building of such dimensions could not be built for $3,000,000.

Mr. Ryan. — Although these representations were made by the official organ of the House — acting honestly no doubt, having been deceived by somebody — the answer now comes, "You ought to have been too intelligent to have been deceived in a matter of that kind."

Mr. Milliken. — Why, of course.

Mr. Ryan. — The answer made to us is that we ought not to have believed the architect; we ought not to have relied on those estimates; we ought not to have placed confidence in the official organ of the House.

. . . .

Mr. Randall. — I think it proper that my colleague, who was a member of the Library Committee, should have an opportunity to be heard.

Mr. O'Neill, of Pennsylvania. — What I intended was to say what I knew of the recommendation of the committee when the House adopted the plan of Smithmeyer for the building of this Congressional Library. We labored for years in this House to get an appropriation to erect a Library building, every one of us knowing there was not accommodation for the books in the Library or for the increase of books which every day was growing larger. There was no deception about it. When the plan was adopted it was believed the estimate covered sufficient money to go on and build a Library to accommodate the present number of volumes and to provide for the increase which would occur in the next five or six years. It was believed then that $2,300,000 would cover that expense.

Mr. Blount. — Did my friend understand the building was to cost from seven to ten millions of dollars?

Mr. O'Neill, of Pennsylvania. — I had no other idea.

. . . .

Mr. Clements. — The proposition made to-day by the amendment suggested by the gentleman from Kansas [Mr. Ryan] is to retain this site and ask estimates from eminent architects and appropriate the sum of $10,000 to pay for the estimates and plans, so that at the next session of Congress we may intelligently consider the various plans that will be submitted in accordance with that proposition.

It seems to me that that is a business-like and common-sense method of disposing of this whole question. There is no excuse for those who have led the House and the country into this dilemma. It cannot be excused, in my judgment, upon the supposition of an error.

In private business when we go to have buildings erected and work of that character we secure a careful and reliable estimate, and it seldom happens in private business plans that individuals are called upon to add three or four hundred per cent to the amount of the original estimate.

This is only one case in a long line of failures to come within the estimates submitted when Congress was asked to inaugurate a work. We have been confronted with several during this very session of Congress of a similar nature. I will call attention to one or two of the leading ones. . . . I speak of these conspicuous instances which have been brought before Congress at the present session for which deficiencies have been appropriated. Cases of this sort are occurring too frequently. In many instances we would not have entered upon the work originally had we known its cost or that it would be within the neighborhood of what it has afterward turned out to be. But having expended so much money already, before we are advised of the full cost, we are compelled in many cases to go on and complete it or sacrifice what has been already granted.

What is the case here in this remarkable instance of deception? I do not mean by this to cast reflection upon any member of the Committee on the Library who reported or who advocated the bill in the Forty-ninth Congress, because they were doubtless deceived just as the House was; but here has been an expenditure of $585,000 for the site. That site we have already acquired, and I understand there is no question but that it has been secured at a reasonable price. Five hundred thousand dollars has also been appropriated to carry on the work, of which only about $200,000 has been expended, leaving about $300,000 still on hand. We have not gone far enough with this, therefore, so that we are compelled to go on and ratify this fraud. We may call a halt here and then begin in a business-like way to get a reasonably accurate estimate, and after making a commencement in the right direction we can proceed properly with the work.

If this amendment is adopted we will suspend the work only until the next session of Congress, and may still complete it according to the plan that shall be adopted earlier than upon the present plan.

It has been argued by gentlemen that we should make our plans of this building in accordance with what they have done in European nations. I am perfectly willing to go to the full extent to provide an ample library for our people. I think it is only proper that it should be done. But what have we now? In 1884 we had only about a half a million of volumes and a hundred and seventy thousand pamphlets, the estimated value of which was only about $750,000, I am advised. It is proposed to take care of these at a cost of nearly fifteen times the amount that the Library was estimated to be worth at that time. The cost, if this present plan should be carried out at the enormous expense which it is certain to entail, will not fall far short of $20 a volume on every book in the Library.

I admit that we are not building a Library for to-day only, but that it is for the years to come — for a century — but even taking that view of it, there is no excuse for the expenditure of this large sum, notwithstanding the apology that has been made by the gentleman from New York, the gentleman from Pennsylvania, and the gentleman from Mississippi. When this bill was before the Forty-ninth Congress it was substantially stated, and emphasized twice in the report of the chairman of that committee, that the whole cost would not exceed $2,323,000.

After several unsuccessful efforts to pass the bill, and after several plans and estimates were submitted, the Forty-ninth Congress chose the present plan upon the distinct, emphatic, and repeated statement by the Committee on the Library of that Congress, that the whole cost would be $2,323,000, except certain shelving and interior work which might be needed in the years to come after the Library had grown, and that this additional work which might be required within the next fifty years would not cost more than $700,000. . . . I did not vote for this bill in the last Congress, yet I repeat that I am willing to vote every dollar necessary for a commodious, durable, and reasonably handsome building for the Library. But I am not willing to vote to squander three or four times the necessary amount in order to follow in the footsteps of the oppressive and extravagant monarchies of the Old World.

. . . .

Mr. Blount. — Mr. Chairman, this is not a question as to whether or not the plan of this building is what it should be; nor is it, sir, a matter for us to inquire into as to what France has done, or England has done, or some other great nation has done in the same connection. We are confronted with a monstrous imposition, and the honor of this body requires that it should pause and inquire into that imposition.

In the Forty-ninth Congress the House was asked to vote a

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Library building according to the plan then submitted. It was estimated that the cost of that building would be about $3,000,000.

Not one line in the report of the distinguished gentleman from Mississippi, Mr. Singleton, not one line in his speech, not one line of the debate in the House or in the Senate, suggested the thought that the amount was to pass beyond $3,000,000. To-day a Cabinet officer discovering the imposition, after careful, intelligent, deliberate consideration, surrounded by experts to counsel him, has felt impelled to go before a leading committee of this House and communicate the astounding fact that notwithstanding what has been done in the past the building is likely to cost from seven to ten million dollars; more than twice the original estimate, possibly three times the original estimate. Will this House hear it? He tells you at an hour when you are not committed to the plan, when only the first wing is proposed to be commenced, that you may have fair notice that you are leaping into a terrible job. Why, sir, if we do not stop here in the midst of these facts, if we do not suspend this building here, the country will have a right to think this is a fine field for the lobbyist ——

Mr. Milliken. — Does the gentleman say there is a job in this?

Mr. Blount. The gentleman has had his time and ought not to take mine. I decline to yield to the gentleman. I have only five minutes. I think there are two sides to this question.

Mr. Milliken. — Do not get excited over it.

Mr. Blount. — I hope my friend will not interrupt me. There is no propriety in that.

Mr. Milliken. — I have asked a simple question, which I think the gentleman ought to answer.

Mr. Blount. — I say when it appears that a joint committee has made five reports in several Congresses, that there has been one persistent plan to put that building nowhere else except at the east front of this Capitol; one persistent plan for a building to cost $3,000,000 which turns out to be $10,000,000, it is time for this House to stop, to refuse to vote a dollar; to begin *de novo* and say "what sort of Library are we to have? Let us first determine upon a plan and then determine upon the appropriation." There is but one course left to this House. The last Congress was miserably deceived as to the cost of this work. If it had then been ascertained it would cost $10,000,000 every gentleman will concede the impossibility of having passed the act through both branches of Congress. . . .

Mr. Chairman, I opposed this building originally. I never liked its surroundings. I never liked the persistent purpose that no piece of ground except one should be selected. I never liked the persistent claim that no plan but one was satisfactory and should be selected. I am not surprised at this hour, after a struggle for years, that we should have the disclosure of a Cabinet officer coming and calling the attention of this House to the fact that whatever is done hereafter should be deliberately done. If the House means to carry out the plan of the original schemers, let the responsibility rest where it belongs.

. . . .

Mr. Gay. — I hope, Mr. Chairman, that that amendment will not pass, for the reason that it proposes a new scheme, whereas I believe we have a foundation already laid which will serve every purpose, and I think I can offer an amendment which will meet the occasion and will be satisfactory to the House. I offer the amendment which I send to the desk.

The amendment was read, as follows:

That hereafter, until further authorized by Congress, all further expenditures in construction on the Congressional Library building shall be restricted to the erection and completion of that portion of said building to be erected on the plan represented by plan No. 1, herewith submitted.

Mr. Gay. — Mr. Chairman, I think, as I said before, that this plan is satisfactory to Congress and the country, and if we restrict further appropriations for construction to the foundation already laid, that will keep the outlay for the building within the limit which the gentleman from Kansas proposes, and at the same time will leave an opportunity for Congress, if it chooses, to add other structures at either end, or to carry out any other plan at its leisure.

Mr. McCreary. — Will the gentleman state what the cost of the building would be on this plan?

Mr. Gay. — Not to exceed the sum mentioned in the original estimate, which is $2,300,000.

Mr. Chairman, I felt disgusted and outraged at the idea which was prevalent in the minds of some gentlemen that the adoption of the plan for this Library building had fixed upon the work and upon Congress an architect who might consider it a life-long job, but when I examined the matter I found that that was not the case, and that it was merely his plan that was adopted. I will state further that the Committee on Appropriations provide for putting the work exclusively under the charge of the Secretary of the Interior, who, as other gentlemen have stated, is a prudent and efficient business man, and who is authorized by the proviso in this bill to employ any architect or to carry out the work in any manner dictated by his own judgment.

Mr. Kelly. — Mr. Chairman, I desire to say that for nearly eight years, when in Washington, I have been in daily intercourse with the architect whose design for a Library building we have before us. A more honorable gentleman I have never known, a more scrupulous, conscientious, honorable gentleman I have never known. Here is the plan [exhibiting it] upon which I voted for one wing of the building, and the main reading-room with its alcoves, etc. The plan of the whole building, when completed, is for a building that will accomodate eleven million volumes, and the idea is not thought of by Mr. Smithmeyer nor even broached to Congress, that it should be gone on with at once. To build thus much, which can be done for $2,400,000, will accommodate the existing Library and its probable increase, allowing for the natural growth of authorship and publication, two sets of all American books being contributed to the Library.

Mr. Blount. — I just want to ask the gentleman whether he claims that the plan he holds in his hand and upon which he says he voted, is the plan that is to be found in the report of the Committee on the Library, of which Mr. Singleton was chairman.

Mr. Browne, of Indiana. — If it is not, that is not the fault of the architect.

Mr. Kelley. — I have not read the report through. This is the essential plan of the building, which can be elaborated as time may disclose the need for further space. And, sir, instead of no competition having been invited, this gentleman encountered the competing plans of forty-one American and foreign architects. Through seven Congresses, fourteen long years, he was before the Library Committees and the Committees on Public Buildings, and his plans were scanned and were finally adopted, and the leading authorities on the other side of the Atlantic, as they express themselves in the journals of architecture and engineering, all say that the world has the plan of a perfect library building in the plan of John L. Smithmeyer for the National Library at Washington. There is not a want unprovided for. Maps, charts, music — everything of that character may be provided for in the flat compartments which are embodied in this plan, while the books are to fill the alcoves. I trust no measure will be adopted to modify the plan, and say that the American Congress shrinks from giving to posterity a building superior to structures in other lands designed for similar purposes, and equal to the probable exigencies of the country for a century to come. Two million four hundred thousand dollars will build this structure in such a manner as to meet the public wants for many years.

Mr. Randall. — Mr. Chairman, it has been claimed that there was no misinformation given to the House in the Forty-ninth Congress touching the amount of money this building was to cost; and a statement has been made that "plan No. 1," as indicated a moment ago, was the plan which was in contemplation when $2,300,000 or thereabouts was fixed as the probable cost. I do not see how gentlemen can reconcile such a statement with the fact that immediately upon the work being undertaken under that law, and in pursuance of that statement, there was dug a foundation for a building that was to cover the entire space purchased.

Mr. Kelley. — Oh, I think that is not the case.

Mr. Randall. — I know it is the case.

I am not a judge whether a man is competent to be an architect, except as I learn his capacity from others, or as I see with my own eyes the results of his work. . . .

I want to deal with this subject impartially; the Committee on Appropriations want to do so. In the measure reported as a part of this bill they have taken care to get rid, so far as possible, of this commission, and to throw the responsibility entirely upon the single Cabinet officer who has communicated to the Committee on Appropriations the facts stated by the gentleman from Georgia [Mr. Blount]. We have, therefore, decided that the commission should be put out of existence, and that the $500,000 appropriated should be under the care and custody of the Secretary of the Interior. The proposition as embraced in the bill was a wise one. The one proposed by the gentleman from Kansas may be wiser; the House can judge of that.

The Chairman. — Debate is exhausted. Does the gentleman from Louisiana [Mr. Gay] offer his proposition as a substitute or as an amendment?

Mr. Gay. — I offer it as a substitute; and I would like to say ——

The Chairman. — One substitute for the paragraph in the bill is pending. The gentleman from Louisiana [Mr. Gay] will have to withhold his substitute until that is disposed of. The Chair will recognize the gentleman again.

Mr. McCreary. — I ask that the pending substitute be read.

The Clerk read as follows:

Strike out the paragraph in the bill, and insert the following:

"That the Committees on Public Buildings and Grounds of the Senate and House of Representatives, acting conjointly, shall, within ten days after the passage of this act, invite from eminent architects, not exceeding five in number, designs and general specifications for a building for the Library of Congress, to be erected on the site purchased for that purpose in the city of Washington, the cost of the building not to exceed $3,000,000; and the sum of $10,000 is hereby appropriated to be expended under the direction of the above-named committees, to pay for the said designs and general specifications. The said committees shall jointly report to Congress their action in the premises on or before the 20th day of December, 1888.

"That the work now in progress on the building for the Library of Congress shall be suspended, and the commission authorized by act of Congress approved April 15, 1886, be, and the same is hereby, dissolved.

"That the property purchased for a site for the Library of Congress, including the buildings thereon, together with all plans, records, and other property of the United States connected with the building for said Library of Congress, be, and the same is hereby, transferred to the care and custody of the Interior Department; the expenses of such care and

custody shall be paid out of any money already appropriated for the construction of the building for the Library of Congress."

Mr. Holman.—I move to amend the substitute by adding what I send to the desk.

The Clerk read as follows:

And the said committee shall also inquire into the practicability of securing proper Library accommodations for Congress and the District of Columbia by constructing a Library building and for a public library on one of the public parks of the city of Washington, at a cost not exceeding $2,000,000, in which shall be deposited from time to time the surplus books accumulated in the Congressional Library, or that shall hereafter so accumulate, not required for the use of Congress, and said public library shall be open to all the citizens of the United States, and report thereon.

Mr. Holman.—Although that expresses my views, I will withdraw it.

The question recurred on Mr. Ryan's substitute for the paragraph of the bill.

Mr. Nutting demanded a division.

The committee divided; and there were—ayes 68, noes 34.

Mr. Nutting.—No quorum has voted.

The Chairman appointed as tellers Mr. Ryan and Mr. Nutting.

The committee again divided; and the tellers reported—ayes 114, noes 50.

So the substitute was agreed to.

STATEMENT OF THE ARCHITECT OF THE CONGRESSIONAL LIBRARY BUILDING.

[AN unsigned and undated printed document under the caption above has reached us, from which we make the following extracts:]

BY the terms of the Sundry Civil Bill passed by the House of Representatives June 22, the Act of 1886, authorizing the construction of a Congressional Library building, is abrogated, and in lieu thereof "designs" are to be invited from five eminent architects for a Library building, and for the preparation of which six months are to be allowed. This really means a postponment of the work for twelve months, if not longer, without gaining anything by it, and, besides, postponing the relief to the existing Library in its overcrowded condition, which necessitates the most speedy action. It is obvious that no satisfactory plan can be made for a Congressional Library building in *six months*—at least none which could, under any circumstances, be favorably compared with a plan which has been perfecting for *twelve years*. Nor is it to be presumed that *five* architects, however eminent, can produce better results in *six months* than *forty-one* in *twelve years*.

Considerable stress has been laid upon the supposed ultimate cost of the building, and inferences have been made that Congress was deceived in this matter. It is certainly not to be presumed that a building of the magnitude and character of the contemplated Library building could be erected in *three years*, and for the sum of $2,300,000. This edifice will cover 111,000 square feet of area, or about 21,000 square feet more than the State, War and Navy Department building, and about 40,000 square feet more than the Post-office building in New York City. It will be absolutely fireproof, and constructed of the best building materials.

In the course of debate in the Forty-eighth Congress, a request was made by the Committee on Additional Accomodations for the Congressional Library to indicate upon a separate plan (marked "A") what portion of the adopted plan should be *pushed ahead* to speedily accommodate the present collection of books, pamphlets, charts, etc., making a reasonable allowance for the accretions for a few years to come, the remaining portion of the building to be erected in whole or in parts, as rendered necessary by the rapid increase of the collection, and as Congress should elect. The cost of the portion referred to (marked "A") was approximately estimated at $2,300,000 in three years, or $3,000,000 as the *ultimate* cost of that portion. . . .

The House received this information from the committee, and debated the matter, but no action was taken upon it.

It is not fair to regard an estimate made eight years ago as of value now, its accuracy being entirely destroyed by the fluctuations in the cost of materials since that time. Neither is it fair to presume that an accurate estimate of the quantity of material required can be made from hastily-prepared sketch-plans. Nor is it possible to make an accurate estimate without a specification showing the quality of materials required and their kind, whether marble, granite, sand-stone, or brick. The estimate made for Plan "A" in 1880 was based upon a brick building with stone trimmings, brick being about that time regarded as a very suitable material for public structures, as is evidenced by its use in the construction of the Pension Building.

The error of regarding such an estimate as accurate is apparent from a glance at the bids for stone and drain-pipes for the Congressional Library building, made by highly-responsible contractors within the last six months. These bids vary from forty to one hundred per cent, and were made from detailed drawings and minute specifications, while the estimate just referred to was made upon a general sketch-plan without details.

It is probable that the estimate for $2,300,000 above referred to would not vary very considerably from the actual cost of the building shown on Plan "A," if constructed of brick and finished correspondingly on the inside.

In view of the fact that stability is one of the chief requirements of a public edifice, special care was taken to secure that result, by the introduction of a system of uniform foundations. Practical tests developed the fact that the soil upon which the building is to stand is of varying compressibility, unlike rock, gravel, or sand; and in order to secure a uniform strength for every part of the structure (as it will finally be built) and to guard against cracks and breaks in the superstructure (which occur at junctions of walls built at different times, caused by the uneven settlements of these respective walls) it was thought to be a wise precaution to establish at once a suitable and continuous bed in the shape of a concrete foundation for the entire structure, which takes the place of a continuous underlying rock stratum, upon which the whole building can be placed at once, or in part, without producing any cracks or breaks. It would, in fact, be a good precaution to build the massive cellar walls for the whole structure now, and cover them up until the superstructure may be built upon them. A massive building like the Congressional Library, with high and long continuous walls, requires special care and precaution in construction.

Finally, in 1886 (Forty-ninth Congress), the committee recommended, and Congress adopted, the plan in question for the Congressional Library building, and $500,000 was appropriated for commencing its construction. The Act appointed a commission for constructing the building, which took possession of the property acquired by the United States. They appointed the architect whose plan was adopted by Congress, and commenced operations. The site was cleared of buildings, stone-yards, etc. Contracts were entered into for laying the sewerage and drainage, for excavating the cellar and areas, digging the trenches, and for laying the concrete foundations. A controversy arose over the quality of cement furnished for the foundations, but this matter was finally settled by the Commission, and the work of construction began in earnest, and has since been pushed forward energetically, and in accordance with Plan No. 1. To stop the work now, after two years of preliminary work and an outlay of over $200,000, would be an almost irreparable error, and possibly lead to all the irritating delays of extensive litigation.

The plan adopted by Congress in 1886 contemplates the erection of a Library building which will meet the requirements of the existing Library and its accretions for a few years to come, as well as (ultimately) the extreme demands of the future. Such a portion of this comprehensive plan (shown on Plan No. 1) as will relieve the pressing necessities of the Library should be speedily erected. This would furnish at once the requisite space for the overflowing collections now suffering injury, while the final completion of the building will not be required for many years. The plan, for the execution of which the Forty-ninth Congress made the first appropriation, requires the construction of a building which will be, when completed, abundantly capacious to accommodate eight or ten millions of books, and the great multitude of charts, maps, engravings, manuscripts, works of graphic art, and the numerous productions received by copyright.

ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

DOORWAY TO HOUSE OF C. C. CONVERSE, ESQ., BEACON ST., BOSTON, MASS. MESSRS. ALLEN & KENWAY, ARCHITECTS, BOSTON, MASS.

[Helio-chrome, issued only with the Imperial Edition.]

GOTHIC TOWERS AND SPIRES, PLATES 19, 20 AND 21.—ST. MARY'S, NORTH PETHERTON; SS. PETER AND PAUL, EYE; SS. MARY AND ANDREW, WYMONDHAM; ST. ANDREW'S, COLLUMPTON; AND ST. PETER'S, OUNDLE, ENGLAND.

[Issued only with the Imperial Edition.]

HOUSE OF PERCIVAL KNAUTH, ESQ., NEW YORK, N. Y. MESSRS. LAMB & RICH, ARCHITECTS, NEW YORK, N. Y.

THIS house is now building near the Riverside Drive. It is peculiar in plan, the kitchen being back of a large central hall which runs from dome to base. This kitchen is, however, four feet below the entrance hall and thus runs up in height to the level of the parlor floor. The ground floor is 8′ 6″ in height and the story above is a magnificient suite of music-room, central hall, and dining-room. The roof is built after the fashion of the Spanish roof with a terrace garden overlooking the Hudson River.

HOUSE FOR CARLETON SPRAGUE, ESQ., LAKE ERIE—WEST HAMBURG, N. Y. MR. E. A. KENT, ARCHITECT, BUFFALO, N. Y.

35′ x 72′; with 9 bed-rooms in second story. All shingled; hard-wood interior in part; one coat plaster. Built for $3,500.

TWO COTTAGES NEAR BOSTON, MASS.

HOUSE FOR C. A. WILKINSON, ESQ., BINGHAMTON, N. Y. MESSRS. T. I. LACEY & SON, ARCHITECTS, BINGHAMTON, N. Y.

FREEMAN COLLEGE OF APPLIED SCIENCE, INGLEWOOD, CAL. MESSRS. CURLETT, EISEN AND CUTHBERTSON, ARCHITECTS, SAN FRANCISCO, CAL.

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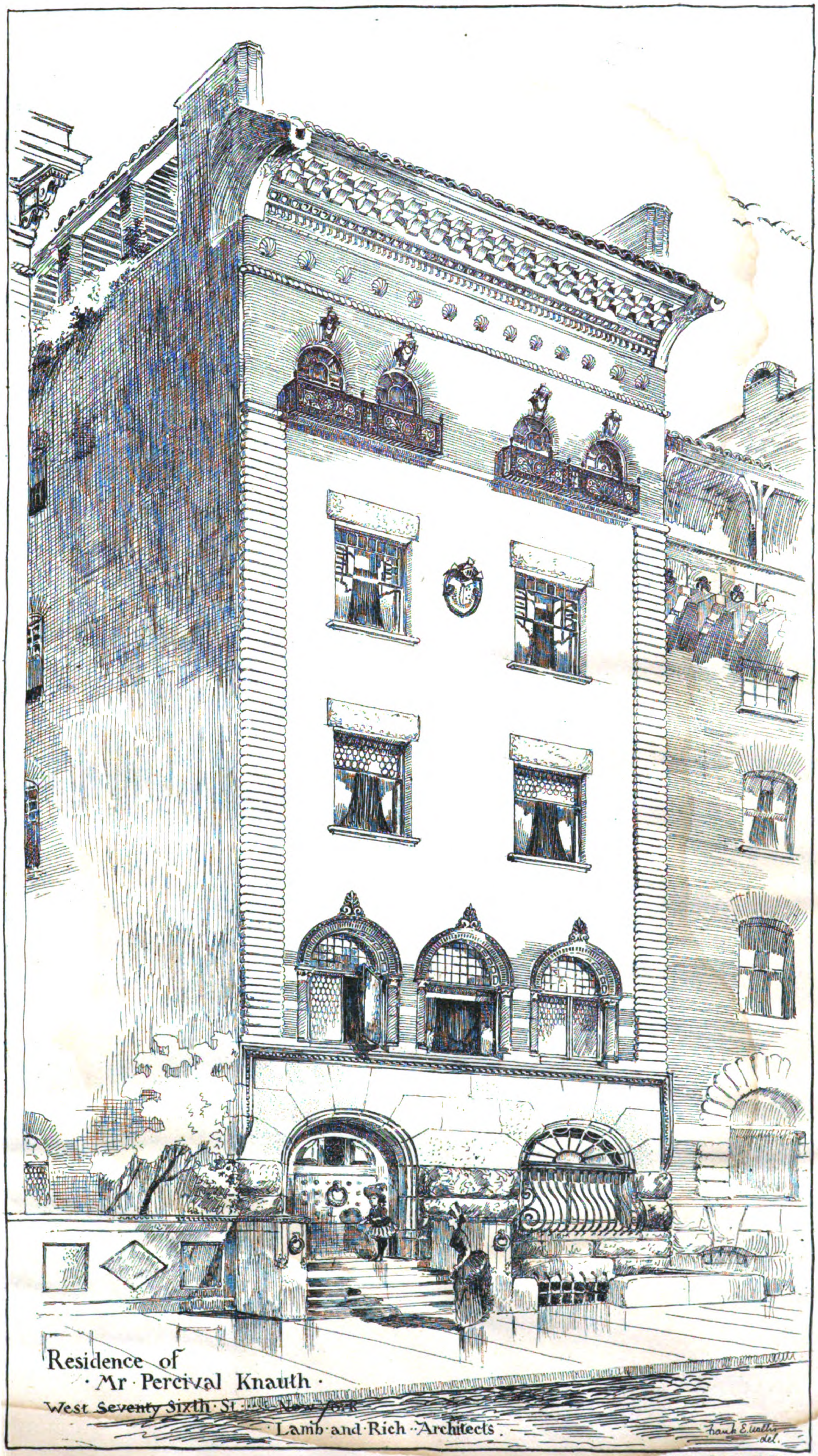

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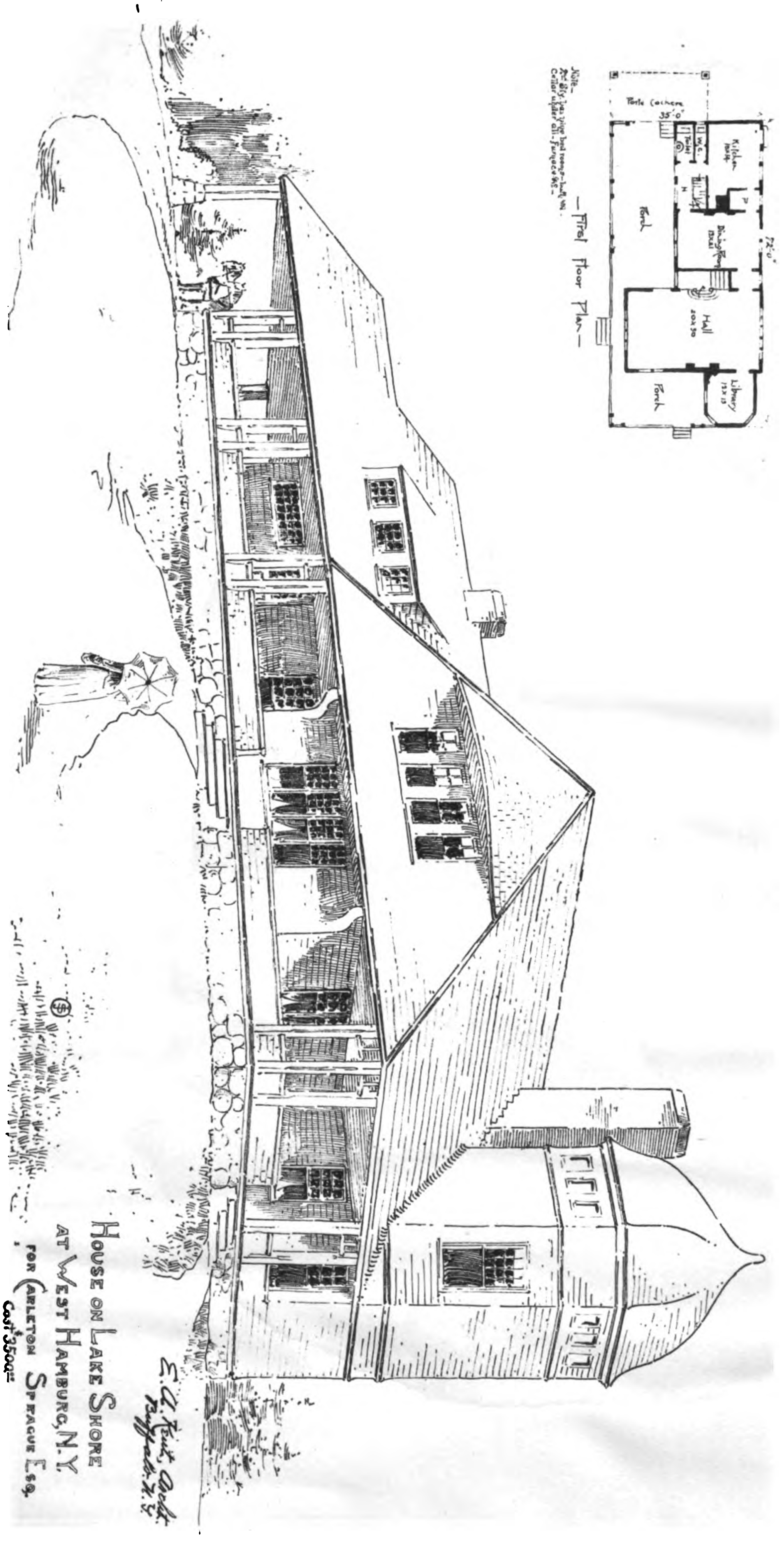

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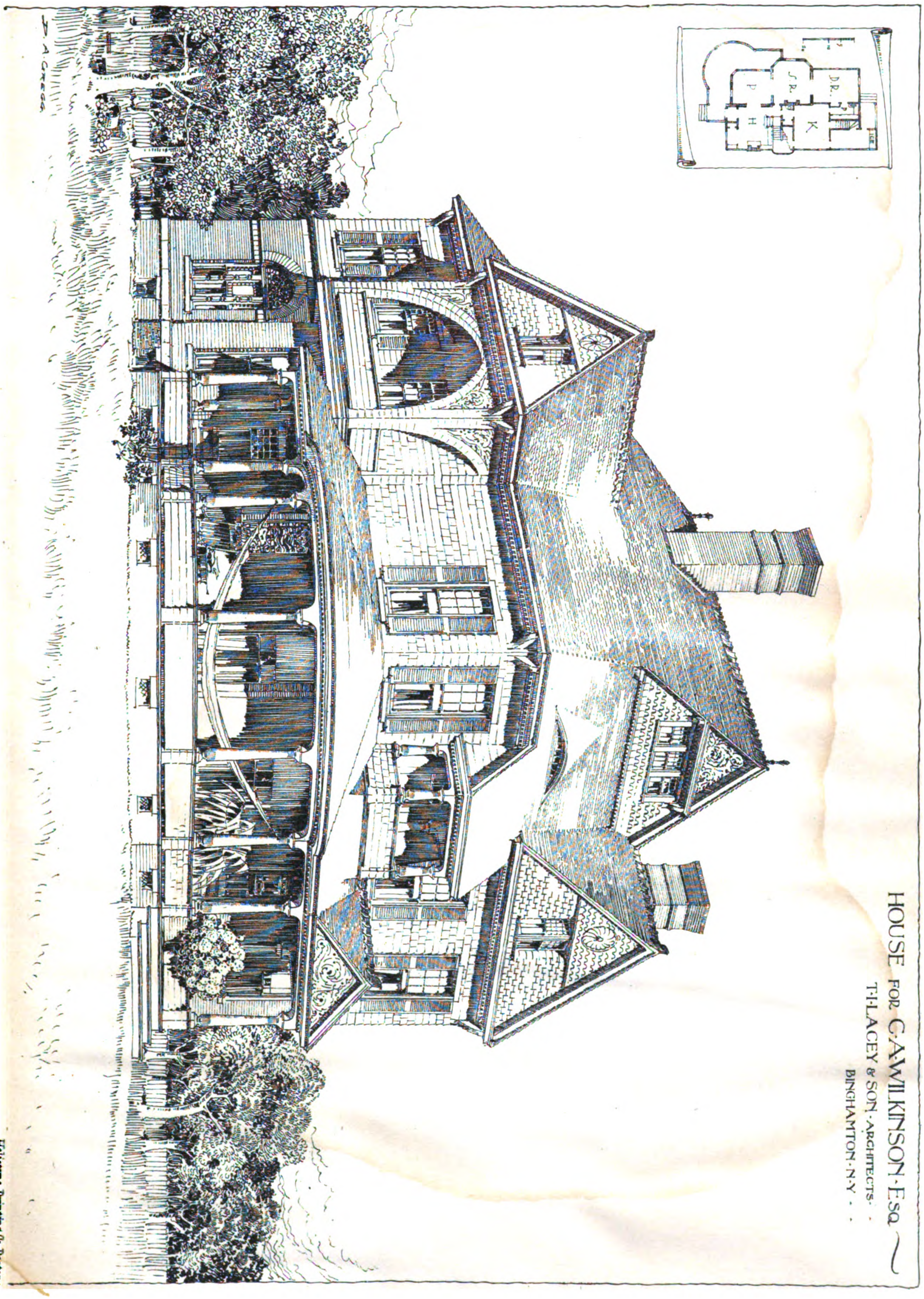

HOUSE FOR G. A. WILKINSON, ESQ.
T. I. LACEY & SON, ARCHITECTS,
BINGHAMTON, N. Y.

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THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIV. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 657.

JULY 28, 1888.

Entered at the Post-Office at Boston as second-class matter.

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TRADE SURVEYS. 44

THE *British Architect* has received from Mr. Fox, of Boston, a copy of the new Building-Law of that city. Mr. Fox, in the note accompanying the book, is too modest to mention that he was himself the most energetic promoter of the passage of the statute, and the author of many of the best provisions in it, but this should make the warm, and evidently sincere commendation with which it is received all the more gratifying to him. Although far from what its promoters wished it to be, it is one of the best codes for the regulation of building yet established, and the *British Architect* well says that "such disasters as that in the Edgware Road" (the fall of a building) "where defective construction played such a prominent part in the destruction of human life, would be practically impossible in Boston," and, further, that "in comparison with the by-laws of many of our English towns, Boston ought to be an exceptionally well-built city." It should be borne in mind, in estimating the value of this praise, that the ordinary methods of construction in this country are far more hazardous than they are in England. Few English houses have any sort of wood furring on the inside of their brick walls, and many of them have not even wooden window or door frames, while the stud partitions, especially in the older houses, are very frequently "brick-nogged," or, as we should say, filled in with brick between the studs. Compared with such a structure, the ordinary New England brick building, with its walls furred with spruce strips from cellar to roof, its chimneys encased in a cage of studding, wood-lined exterior cornices, its "air-spaces" in the attic, and hot-air pipes everywhere, and its roaring furnace in the basement, is a mere tinder-box, yet we may confidently say that Mr. Fox and his associates, by the ingenuity with which the perils of so light a construction are met, have, while retaining all its undoubted advantages of dryness, reduced the risk from fire in it below that in the average London house, while in other respects the construction which the new law enforces is much better than that often seen in England, where, as our readers know, it is not unusual to hear of the arrest of a builder for laying bricks in "road-scrapings," instead of mortar, or for some similar enormity.

IT is not that the speculating builders of Boston have no disposition to use a cheaper material than mortar, if they think they can do so with impunity — their exploits in the way of South End plumbing a few years ago would make that clear — but under the present administration of the statute they have little chance of committing any flagrant violation of it without being caught and punished, and they do not try. Unlike the English laws, under which the inspectors devote their principal attention to the plans, our American statutes provide for a more or less efficient supervision of the actual operations, and the officers appointed for this work exercise almost despotic authority. With the small official force employed, such authority is recognized as necessary to efficiency, and, although an appeal lies from the deputy-inspectors to their chief, and from him to a commission of experts, an order from a deputy to remove a tier of floor-beams too light, in his judgment, for their work, to take down and rebuild a doubtful piece of wall, or to cart away a lot of damaged cement, or dirty sand, is rarely resisted. This sort of administration is really the essence of an efficient law, and, as the *British Architect* remarks, another important merit of the Boston law, which it shares with that of other American cities, is the strictness with which it requires that minor alterations shall be subject to its provisions, as well as more important building operations. In the familiar phrase, "any change or addition in, to or upon any building, affecting an external, party or partition wall, chimney, floor or stairway," in a Boston or New York house, must be approved by the Chief Inspector of Buildings, and carried out under the supervision of his deputies, and the disasters which, under different auspices, have so often followed the attempts of amateurs or ignorant builders to "knock out a window" in a wall, or "do a little cutting" in a floor, or a little digging about the foundations of their own dwellings, or those of other people, are here almost unheard of.

MR. H. W. Fabian, of New York, publishes in the regular Proceedings of the Technischer Verein of that city a discussion upon the action of forces in arches which presents some novel points. He applies the principles which he deduces from his reasoning to the vaulted ceiling of the Assembly-Chamber at Albany, and concludes that, while its construction was incorrect, and sure to fail under the loading which was put upon it, certain modifications might have been made in it which would render it perfectly secure, and he is rather disappointed, we judge, that this should not have been done. We are not sure that we agree with him. Although a bold and startling piece of construction has a certain interest, it is not an artistic interest, and the admiration we feel for it should be carefully distinguished from that with which we regard a beautiful object. At present we need, more than anything else, to pursue the path of beauty in architecture rather than that of startling novelty. The Americans have amazed the world by their temerity long enough to be satisfied with the reputation they have gained; and they may now safely try to make their buildings attractive in some other way.

THE great interest taken by Americans in the sales of the Demidoff, Hamilton and other famous European collections, leads us to suppose that a similar interest will be felt in the approaching sale of a similar collection which is to take place early in the coming autumn. For one reason or another, Portugal is a little off the regular line of American travel in Europe, and few probably know that high up on the mountain side in Cintra, a few miles from Lisbon, lies the Castle of Pena, which should be familar to English readers from the reference to it in Byron's "*Childe Harold.*" The town below is somewhat affected by the inhabitants of the neighboring capital as a summer resort, and was probably made more popular still by the selection of the castle by the late King Dom Fernando as his favorite place of residence. Much money has been spent in converting the place from its original conventual character into a modern royal residence, and more money still in collecting together the specimens of paintings, sculpture and bric-à-brac which now form one of the choicest and most carefully selected collections in Europe. These collections are somewhat unique in that they were largely gathered by the king in person, who was himself an artist of no slight pretensions, painting, modelling and etching with no little assiduity. The castle and collections were the personal property of the late king, and as his successor has no desire to acquire them personally, and as the royal exchequer is too empty to allow

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the government to buy them for public use, they are to be thrown on the market and disposed of to the highest bidder. A castle in Portugal may not be as attractive as one in Spain, but the collections are transportable, and American gold would find ready acceptance at Cintra if any of our collectors should send agents to attend the sale.

CONTRACTORS, and others, who use horses for heavy draught, may find it useful to know of certain experiments which have been made in lightening the work of the animals by the use of elastic traces. Some time ago, as *Le Génie Civil* informs us, M. Celler, Chief Engineer of Roads and Bridges in France, expressed a doubt whether the traces of leather or rope, or the iron chains, by which horses pull their load, could not advantageously be replaced by more elastic appliances, which would diminish the effort needed at starting, to overcome the inertia of a heavy cart or omnibus. Every one has noticed that a dray-horse is often obliged to use all his weight and strength to start a vehicle which moves along easily enough when once set in motion, and it is quite conceivable that springs in the harness might make the work easier by distributing the movement of starting over a longer period of time. Acting on M. Celler's suggestion, the directors of the Eastern Railway of France began six years ago to harness all the horses employed in shifting freight cars at their Paris station with traces made of chains, having a strong spiral spring inserted in them. A large number of horses is employed in this service at the station, and the effect of the change has been very satisfactory. A considerable gain has been made in the durability of the harness, and the regularity of the work, through the diminution of the number of chains broken in service; while the horses have done their work better, and with less fatigue. The blow of the collar on the shoulders at starting is far less violent, and less injurious to the animal, than under the old system, and the horses, finding that a strong, continued pressure will effect as much as the jerk which was formerly necessary, seem to gain courage, and pull steadily and directly, instead of wasting their strength in ineffectual plunges. During the six years of trial, the directors of the Company have become so convinced of the superiority of the new mode of harnessing that it has been adopted in all portions of the vast net-work of lines under their control.

A RIVAL of Mr. Buddensiek seems to have met his reward in Germany, to judge from an account in the *Bautechnische Zeitschrift*. In October, 1886, a building in Hamburg, which had been nearly completed by the contractor, Brümmer, fell, while the workmen were in it, killing three of them, and seriously injuring four more. Two experts, an architect and the official inspector of buildings, examined the ruins, and decided that the immediate cause of the fall was the giving way of a bay-window, which was partly built, and, by its collapse, had shaken the neighboring walls so much as to overthrow them. It was ascertained that the bay was to have been supported on projecting iron beams, or cantilevers, and that these were in; but the walls had not been built up on the inner ends, so as to keep them from being overbalanced by the weight of the bay, and a temporary support, which seems to have been inadequate, had been set up under the bay. In any case, it appears to have been rather doubtful if the iron construction, even when completed, would have held the bay securely, and the evidence showed that the materials used in the building were generally poor, and the workmanship hurried and bad. The mortar, particularly, had little cohesion, and the bricks seemed to have been laid without wetting them. The contractor denied that either the workmanship or the materials were faulty. He said that he was a regularly trained mason, had acted three years as foreman, and had been a contractor on his own account for eight years. It was very unlikely that he would be ignorant or neglectful of the rules of his art, and his materials were of good quality. He attributed the fall of the bay to the removal of the temporary support by some unauthorized person, and thought it possible also that the carpenters might have pushed the wall out of its place in setting the floor-beams. In regard to the responsibility for the accident, he claimed that if the ironwork, or any other part of the construction, was defective, the architect who had furnished him with the plans was the one to blame; if the carpenters had pushed the wall over, they were accountable. The architect testified that he had made the drawings for the ironwork by the direction of the contractor, and according to his instructions; and, to make sure they were understood, he had furnished a model, showing how the cantilevers were to be set. He thought that the weight of the bay had been allowed to come on the projecting ends of the cantilevers before the inner ends were loaded by the walls. Brümmer denied this, and said that he gave directions to have the masonry built on the inner ends, but no one was produced who had heard the directions. Several experts were examined, one of whom testified that the carpenter-work was not very good, and not very bad; while another said that it was a disgrace to the man who did it. A third thought that the catastrophe was due to the insufficient anchoring of the floor-beams, while a fourth laid it on the ironwork again, and exhibited a model to show that it was inevitable with such construction. A fifth thought that many defects, both in the plan of construction and the execution, had combined to cause the accident. In answer to questions, however, he said that he thought the mason was the person responsible, and that, although bricks were often laid dry, he regarded this as a violation of the well-known rules of the art of building. How the court could have formed any opinion from such conflicting testimony it is difficult to see, but it decided that the mason, Brümmer, was the person at fault, and ordered him to pay the costs of the trial, and to be imprisoned for three years, and on appeal this judgment was confirmed.

THE *Engineering and Building Record* describes an "hydraulic shovel," which has been used in the work on the Forth Bridge with good effect. In sinking the caissons for this huge structure a stratum of boulder clay was found, so hard that the pick would remove only pieces about as large as a man's fist, and the labor of excavation was very costly and fatiguing in consequence, the more so as it was necessarily carried on in an atmosphere under considerable pressure. Under these circumstances, it occurred to Mr. Arrol, who has already invented on the spot many useful appliances for the work, that the iron roof of the caisson might be made to serve as a resisting point, the reaction of which would help to drive a shovel into the clay. To make this available, large shovels were made, with handles consisting of hollow cylinders, in which moved pistons carrying the blade of the shovel. The handles were long enough to reach nearly to the ceiling of the caisson, and were furnished with supply-pipes and valves. The working face in the clay was about fifteen inches deep, and the spades, exhausted of water, were set with the blades a little back from the face. By turning a valve, water under pressure was admitted to the cylinders above the piston, pushing the cylinders upward until they struck the caisson roof. Continued pressure then forced the shovel blades into the clay, to a depth regulated by the length of the cylinder. The next step was to release the water, which flowed out of the cylinders, allowing them to descend. The workmen then seized the handles, and using them as levers, threw out the shovelfuls of clay, to be broken up and removed by other men, while the blades were reset for another operation. The cost of excavation in this way was about one-half that of removal by hand-picks, and the work was done much more rapidly, and with less fatigue to the men. The exhaust water which accumulated in the caisson was disposed of in a way hardly less ingenious. To avoid distressing the men, the pressure of the air in the caisson, after it was made tight against the entrance of the water around it by sinking the edges into the clay, was allowed to fall to a point much below the hydrostatic pressure due to the head of water above it. As the clay was hard enough to resist the effort of the water to burst through it, there was no danger in reducing the pressure, but it became doubtful whether the pumps used for removing the exhaust water, working in an atmosphere relatively so attenuated, would lift it through the sixty or eighty feet hoist necessary to reach the surface. This question was solved by the bold and simple expedient of setting the suction-pipe so as to draw in air with the water. In passing through the valves together the air and water were churned into a sort of emulsion, much lighter than pure water, a column of which was easily kept pouring out of the upper end of a discharge-pipe eighty feet high, without resorting to force-pumps or air-chambers. Of course, there was a certain expenditure of power in pumping the air, but this was of no importance.

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EQUESTRIAN MONUMENTS. — I.

"Bring forth the horse"! — the horse was brought:
In truth, he was a noble steed. — "*Mazeppa*" — *Lord Byron.*

Bronze Head in the Museum, Naples.

IF the reader is one to whom a horse is a mere adjunct of locomotion, a creature whose ailments are of interest only in so far as they affect the pocket, to be sold without compunction, to die without causing a quiver of sentiment, a pang of regret, he cannot appreciate the underlying love for a noble animal which more than anything else has led to the researches which are to result in these papers—a love which must be considered the key-note to every success that art has achieved in the department of equestrian monuments. Extract sympathy from the works of any artist and a soulless husk is left, which, while it may satisfy the eye for a short time, has nothing to say to the intellect, and soon looses its grasp on the attention of the passer-by and is known not as a work of art but simply as an obstruction to traffic.

Of equestrian monuments that do not excite the sympathies of the observer there are many, just as there are dull works of sculpture of other kinds. They are mere matters of fact, and being made of enduring material last much longer than they should; for the tooth of time bites with difficulty into bronze, and even marble yields but slowly. In passed ages invasion

Balbus the Younger, in the Museum, Naples.

Marcus Nonius Balbus, in the Museum, Naples.

and conquest must have done invaluable service to art, for it may be taken for granted that in time of siege, for instance, it was the poor bronze statues that were first melted for use as projectiles or armor of one kind or another, just as the marble caricatures of contemporary or former worthies must have been the ones first broken into fragments of convenient size for the catapult or of proper weight to drop handily on the heads of the besiegers. For the concealment of works of real art there were generally to be found enough *amanti artium* to interest themselves to some advantage to their own immediate posterity, and our more remote selves. Many a curious adventure must have had the works of art of antiquity which have survived to our day, and as one passes through the museums of modern Europe he ought not to forget his obligation to some group of panic-stricken wretches who in spite of fear and haste succeeded in hiding the masterpiece which now delights him. When one recalls how many of the most highly appreciated works of sculpture in our museums were preserved to us in this way, he cannot wonder at the enthusiasm of explorers or that governments are willing to spend large sums on excavations in the hope that now and then a Venus of Milo or its equivalent may be brought to light.

The equestrian statues that descend to us from antiquity are not many, and how most of them came to be preserved is matter for conjecture, but in the preservation of two of these statues the forces of Nature aided in a very unusual way. In 1719 the site and history of Herculaneum[1] were brought to mind through the

[1] HERCULANEUM. — "Like the neighboring Roman pleasure resort Pompeii, Herculaneum was destroyed by a terrible eruption of Vesuvius A. D. 79; but whilst Pompeii was overwhelmed by showers of burning ashes and pumice-stone, which have easily been cleared away, Herculaneum was imbedded in torrents of lava mud, which has since hardened to the consistency of stone, and has safely preserved all its art treasures for the benefit of posterity. The guides at Herculaneum, who are as ignorant as Italian guides generally are, tell the visitors that molten lava destroyed the town. It is a pity that many writers have supported such an erroneous theory, for had molten lava poured into the town, it must have flowed at such a temperature as would have undoubtedly calcined marble and silver, and certainly have consumed such inflammable matter as papyrus. In fact, up to the date of 1036, no fluid lava, according to the records, flowed from Vesuvius; but since that date, like a stream of molten iron, red-hot lava has poured eleven times on the buried city. Owing to the excessive hardness of the material the excavations are carried on with the greatest difficulty; and as the Italian Government made but slight efforts to obtain the numerous treasures hidden in the solid rock, the excavations are now almost, if not entirely, abandoned. This is very greatly to be deplored, as the objects already brought to light are, from an art point of view, of far greater merit than those found at Pompeii. The excavations were first commenced in 1720 by Prince Elbœuf, who discovered some pieces of marble whilst sinking a well for his country house. Several fine objects were discovered, which were presented to Louis XV of France. Afterwards Charles III of Naples, cleared the theatre, part of the forum, a basilica, resembling that at Pompeii, and a few private houses. The yield of works of art was an uncommonly rich one, consisting of bronzes, marble busts and statues, paintings, inscriptions, utensils, and from the Villa Escolanese the marvellous collection of papyri, over 3,000 rolls. Then for some years the excavations were suspended, to be resumed again in 1868, and then once more allowed to decline, and, as before stated, at present they are almost abandoned. The difficulties are indeed enormous, and the work is very costly, for it is no easy task to remove the huge masses of lava, rock, and tufa stone. Still, the treasures which would without doubt be discovered should amply compensate the Italian Government for the trouble and expense. The principal building cleared is the Villa Escolanese — at least, it has yielded the finest artistic treasures and it belonged to a wealthy Roman, rich in works of art and literature. Most important to the proper survey and original disposition of the villa is the admirable plan drawn up by the engineer, Carlo Weber; but this, like so many of the maps and embossed plans of the first excavations made in the Kingdom of Naples, was lost. Fortunately Direttore Ruggiero recovered it, together with a most important packet of papers referring to other clearings. The map is drawn with such care and fidelity that it fully deserved the high praise of Winckelmann. It is enriched with explanatory notes, and with the aid of numbers and letters it gives the exact disposition of all the objects. The text, unfortunately, does not follow the whole plan — it stops at the discoveries of July 20, 1754, whilst the plan extends to the work of 1760." — *Birmingham Weekly Post.*

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digging of a well, the excavation for which, penetrating the crust of lava and ashes which five or six eruptions subsequent to the original one had accumulated over the unfortunate city to the depth of nearly one hundred feet, brought to light traces of the buried city of promise and interest enough to encourage explorations at different times; the first serious work being begun in 1738. It must be remembered that the excavations at Herculaneum and Pompeii[1] are wholly different in character; in the latter case the city was buried in volcanic ashes over which no lava flowed, so that exploration there is carried on in open trenches and excavations, while at Herculaneum the work is true mining-work with shafts, drifts and galleries entirely below the crust of lava mud. One of the most important structures examined at Herculaneum is the theatre — one capable of seating eight thousand persons — and here were discovered and removed to the Museum at Naples (with the exception of one daughter, now in the Museum at Dresden) nine statues of the family of Balbus, two of which are equestrian statues, — the proconsul Marcus Nonius Balbus and his son. These statues are interesting not only because of the place of their discovery, but because of the unusual attitude of the horses' legs, the two legs on the same side of the body being advanced, so that the horses amble or pace. This attitude was once said to have no earlier prototypes save in the case of the Assyrian bas-reliefs where the same peculiarity exists, but a closer examination of the frieze of the Parthenon shows that the assumption was a mistaken one. Of course, like all imperishable things recovered from these buried cities, these statues were in excellent state of preservation, but, unfortunately, during an attack on Portici in 1799, the head of the younger Balbus, which was at that time stored in the town, was smashed by a bullet, so that the head the statue now bears is a restoration, after a cast made from the fragments. These statues are of marble, and are now in the Museum at Naples.

Marcus Aurelius, in the Piazza del Campidoglio, Rome.

We Americans to whom it is still a matter of much pride to have within the boundaries of the neighboring city even a single public statue, afoot or on horseback, that we can go and gaze upon, cannot imagine the surroundings of a Greek or Roman citizen of even the lower class who was as free as the highest patrician to derive pleasure from the hundreds of statues[2] in the

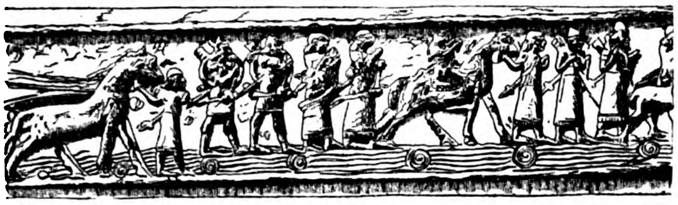
[1] Pompeii. — Destroyed in 79. In ancient times excavations were made, owing to which many valuable relics are probably lost to us, but during the Middle-Ages Pompeii was entirely consigned to oblivion. In 1592 the architect Fontana constructed a subterranean water-conduit in order to supply Torre dell' Annunziata from the Sarno, actually intersecting the ruins, and to this day in use; yet no further investigations were then attempted. In 1748 the discovery of statues and bronze utensils by a peasant attracted the attention of Charles III, King of Naples, who caused excavations to be made. The amphitheatre, and other parts were then disinterred. The Forum, the Street of Tombs, etc., were uncovered in the reign of Murat. Excavations, after being for many years occasional, are now carried on systematically with highly satisfactory results.

[2] Number of Ancient Statues. — "How feeble is the effort of the imagination to conceive the number and magnificence of the public edifices which shot up from Roman soil after the conquest of the Greeks! Here statues singly and in groups adorned the niches, intercolumniations and roofs, filled the pediments and lined temple-steps, theatres, basilicas, baths, gateways, bridges, balustrades and arches of all kinds. Like Rome itself, all the provincial cities had their forums, crowded with temples and colonnades, their capitols crowned by the

Alexander, in the Museum, Naples.

Amazon, in the Museum, Naples.

public places of his native town, and much less can we picture the contents of those villa gardens of Imperial Rome where the descendants of the army contractors of earlier days had collected the artistic wreckage brought by the camp-followers from the many enlightened and art-loving countries that had felt the Roman arms. If we may believe the records many a



Assyrian Bas-relief.

private collection in those days would outshine the average public collections of to-day.

Goth and Hun and Vandal and Saracen and other barbarians[1] visited on the arrogant Roman the violence and robbery that had been served out to those of their kind in other countries, but it is a question whether art suffered more at their hands than it did at the hands of the early Christians when they first began to feel their growing power, and began to war openly against the false gods and their images. Being wielded by enthusiasts, extremists, bigots, the besom of destruction was likely to do more thorough work than would be accomplished by the

Falling Amazon, in the Museum, Naples. From Duruy's "*Histoire.*"

wanton and purposeless mischief of a victorious barbarian who might, indeed, tip a statue off a pedestal or break off a leg or an arm in passing, but was little likely to sit down beside it with a maul and pound it into such small fragments as to be quite beyond the skill of the most painstaking of *réparateurs.*

What might have come to us if it had not been for these enthusiasts, who may be pictured as stern and ascetic as the most consistent of the early Roundheads, is betokened by the existence of the statue of Marcus Aurelius, which is said to be but one out of the twenty-two equestrian statues which even in the fifth century of our era still adorned the public places of Rome. The others have vanished, some, perhaps, to which were assigned the Voodoo-like functions of *telesmata*[2] may hereafter be recovered by following up the indications of some ill-understood record, but this one which had been moved in 1187 by Sergius III from its place in front of the Arch of Septimius Severus to a place in front of the Lateran, was consequently somewhat forgotten, so that when the storm of iconoclasm broke it was taken to be a statue of the Christian Emperor Constantine,[2] and was not only preserved but treated with special reverence.

Michael Angelo, who fashioned the pedestal from a portion of a cornice found in the forum of Nerva in 1538, is said to have entertained the greatest respect for this piece of bronze horseflesh, and when he designed the buildings on the Capitoline Piazza, wished to remove thither the statue from its resting-place in front of the Lateran, but only obtained the consent of the fathers by agreeing that their proprietorship in the statue should be acknowledged each year, an acknowledgment which is still made in the shape of a bunch of flowers sent by the Senate to the churchmen.

The strange and moving tales these almost imperishable memorials of the past could tell can be imagined when it is known that the Marcus Aurelius was once used as a gallows from which to hang a refractory prefect whom John XIII chose to suspend in that way by his hair. In the sixth century, too, it came very near being lost to sight or at least establish-

Nero, in the Museum, Naples.

ing itself after the manner of other peripatetic statues in some other place where it might have been held in less honor; for

temples of Jupiter, Juno and Minerva, as well as their theatres, amphitheatres, baths, circuses — all adorned with sculpture. In 58 B. C. Scaurus, it is said, used for his temporary wooden theatre in Rome three hundred and sixty columns of foreign marbles from Eubœa and Melos, besides three thousand bronze statues. Agrippa, while ædile, 33 B. C., decorated his extensive water-works with four hundred marble columns and three hundred marble and bronze statues, his work to be continued by others. Domitian built so many passages and triumphal arches crowded with groups of statuary, *quadrigæ*, and insignia of war that he became the object of ridicule." — *Mitchell's History of Ancient Sculpture.*

[1] INVASIONS OF ROME.— In 382 A. D. Rome was taken by the Gauls under Brennus and in 408–10 by the Visigoths under Alaric. The Vandals under Genseric plundered Rome in 455 and the Goths under Totila in 546. Its environs were devasted at different times by the Huns under Attila (447) and by the Lombards (755) and the Saracens (846 and 876) and the Magyars, 10th century. In 1084 Guiscard burned the city, and it was sacked by the Constable de Bourbon in 1527. It was also besieged at various times by the Germans and was torn by incessant civic feuds.

[2] TELESMATA. — "From the darkest period of the Middle-Ages, or even from the days of antiquity many cities in Italy had kept the remembrance of the connection of their fate with certain buildings, statues, or other material objects. The ancients had left records of consecrating priests or Telestæ, who were present at the solemn foundation of cities, and magically guaranteed their prosperity by erecting certain monuments or by burying certain objects (Telesmata)." "The Florentines were convinced that the temple of Mars, afterward transformed into the Baptistery, would stand to the end of time, according to the constellation under which it had been built; they had, as Christians, removed from it the marble equestrian statue [of Mars?]; but since the destruction of the latter would have brought some great calamity on the city — also according to a constellation — they set it upon a tower by the Arno. When Totila conquered Florence [in the sixth century], the statue fell into the river, and was not fished out again till Charles the Great refounded the city. It was then placed on a pillar at the entrance to the Ponte Vecchio, and on this spot Buondelmonte was slain in 1215. The origin of the great feud between Guelph and Ghibelline was thus associated with the dreaded idol. During the inundation of 1333 the statue vanished for ever. But the same Telesma reappears elsewhere. Guido Bonatto, was not satisfied — at the refounding of the walls of Forli — with requiring certain symbolic acts of reconciliation from the two parties (Guelphs and Ghibellines). By burying a bronze or stone equestrian statue, which he had produced by astrological or magical arts, he believed that he had defended the city from ruin, and even from capture and plunder. When Cardinal Albornoz was govornor of Romagna some sixty years later, the statue was accidently dug up and then shown to the people, probably by the order of the Cardinal, that it might be known by what means the cruel Montefeltro had defended himself against the Roman Church. And again, half a century later, when an attempt to surprise Forli had failed, men began to talk afresh of the virtue of the statue, which had perhaps been saved and reburied. It was the last time that they could do so; for a year later Forli was really taken." — *From Burckhardt's "Renaissance in Italy."*

[3] MARCUS AURELIUS.— The statue was then commonly assigned to Constantine; but those who pretended to know better affirmed that it was erected in memory of a warrior who, when the city was besieged during the republican times by a powerful king who had come from the East, went forth at midnight, and, guided by the singing of a bird to a place which the king frequented, seized him and brought him prisoner to Rome." — *From Dyer's "History of the City of Rome."*

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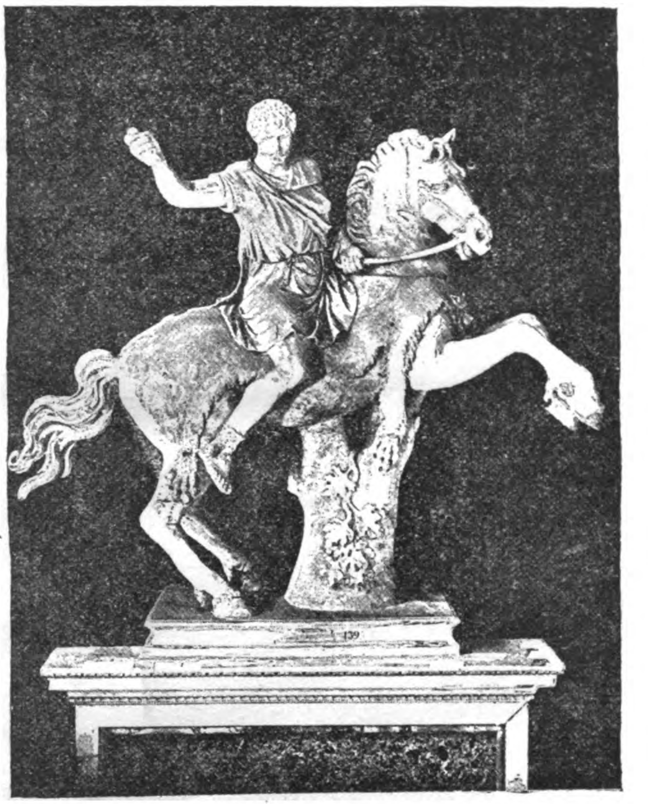
Totila, King of Goths, possibly believing the statue was of pure gold, made off with it, and it was almost ready for shipment when Belisarius overtook him, gave battle, and as one of the consequences of his victory redeemed the statue.

More peaceful and joyous scenes have passed under the sightless eyes of the Roman emperor, as when all plebeian Rome rejoiced when Rienzi achieved the most important step in his career and in 1347 was allowed to make himself tribune: then the great bronze horse was made to take a part in the festivities, and from one nostril discharged wine and from the other water, so that all who could reach it might drink and be merry. Traces of the gilding which once covered, it is thought, both horse and rider, still remain, and local tradition has it that this gilding is not disappearing, but rather on the increase, and when the coating is complete the world will have reached its end. A companion tradition also declares that when the Colosseum falls the world will be annihilated.

In the bronze statue of the emperor Nero, now in the Museum at Naples, we have another statue preserved by the volcanic ashes that covered the forum at Pompeii. There is something laughable about this truculent personage — who was not much given to causing laughter in his day and time — in the way he sits his horse. He seems to be trying to ride as the initiated coster rides his donkey, who sits as far aft as possible



Commodus, in the Vatican Museum, Rome.

seemingly only to prevent by his weight those spiteful flings of the little beast's hind legs, though it really makes the load more supportable than if it bore on the centre of the spinal column.

In the Vatican galleries is a statue of that Beau Brummel of emperors, Commodus, dandy, pseudo-gladiator and supreme brute, who also commanded deification at the hands of an obsequious priesthood and populace and in his pride caused the erection in his own honor of countless statues, mounted and unmounted, until every one was weary of meeting his self-complacent image at every turn and rejoiced when at his death the senate ordered their destruction by wholesale. The statue that survives shows the emperor, perhaps, as about to strike down some hapless victim in the arena. It has the merit, at least, that the man is sitting his horse properly. It is said that Bernini made use of this group in modelling his equestrian statue of Constantine now in the portico of St. Peter's at Rome.

In the Museum at Naples are also the bronze statuettes of Alexander on Bucephalus and two archaic figures of mounted Amazons, both recovered from Herculaneum.

In the same place is the colossal bronze head of a horse, one of the most animated pieces of animal sculpture[1] in existence and in spite of its unnatural position — the severed neck supporting the head upright on a columnar pedestal — attracts admiration from all, an admiration which gains by the legend that it is the emblem of the city. In reality it is all that remains of a statue that stood in the vestibule of the temple of Neptune — in what other place could the statue of a horse be so fitly placed? — where it attracted so much attention, even worship, that the priests finally themselves destroyed it, as the story goes, but fortunately did their ungracious task but ill and the head remains to us. Another story ascribes its destruction to a later date, and the vandal who gave the order for destruction is there said to be an archbishop who needed the greater part of the bronze for a new bell he wished to have cast for his church.

[1] "This horse is a personage; ours are machines." "*Italy, Rome and Naples*," Taine.

Marcus Aurelius Antoninus, the noblest of Pagans, the crown and flower of Stoicism. Born at Rome A. D. 121, of noble blood. His father died when he was an infant and he was adopted by his grandfather, who educated him in the most perfect manner. The noble qualities of the child attracted the attention of the Emperor Hadrian, who adopted as his successor Titus Antoninus Pius, the uncle of Marcus Aurelius, on condition that he in turn adopted his nephew and Lucius Celonius Commodus. After the death of Hadrian and the accession of Antoninus Pius, Marcus Aurelius had the title of Cæsar conferred upon him, and in 140 was made Consul and entered fully upon public life. In 161 Antoninus Pius died and Marcus Aurelius, then forty years old, became his successor ruling jointly with Commodus, commonly called Lucius Verus, who died in 169. Marcus Aurelius had married Faustina, the daughter of Antoninus Pius. Many misfortunes occurred in the reign of Marcus Aurelius — an inundation of the Tiber which did great damage and caused a famine, earthquakes, fires, plagues of insects and a fearful pestilence. Besides, during his reign, the Empire was involved in almost continuous wars with the barbarians. Marcus Aurelius died in 180, after a short illness and was deified. His son Commodus (afterwards emperor) erected to his memory the Antonine Column now in the Piazza Colonna at Rome. He early embraced and throughout his life adhered to the Stoical philosophy. This great philosopher had but one blemish, his hostility to the Christians. His life was in keeping with his precepts. His philosophy is contained in his "*Meditations*" or "*Reflections*," a famous work.

A cast of the equestrian statue of Marcus Aurelius, which Catherine de Medici ordered, was set up in the court-yard of the palace at Fontainebleau (thenceforward called Le Cour du Cheval Blanc), under a roof raised upon four pillars to protect it from the rain, where it remained until the year 1626. It was made for Francis I, about 1540, who sent Primaticcio to Rome to purchase antique marbles and have moulds taken of several famous masterpieces of sculpture that they might be cast in bronze. There was a cast of this statue in the court-yard of the Contranda degli Omenoni known as the Casa Aureleana, at Milan. This house was given by Charles V to Leone Leoni, the sculptor.

Nero. — Lucius Domitius Ænobarbus, called Nero after his mother's marriage to the Emperor Claudius, by whom he was adopted; born Dec. 15, A. D., 37; proclaimed emperor, 54; his first years of rule were marked by kindness and justice, and his last by a series of atrocities, which led to a conspiracy, on the discovery of which and the defection of the Prætorian guards, Nero killed himself, A. D., 68.

Commodus: — Lucius Aurelius Commodus (161–192). Emperor of Rome, 180 to 192. Born at Lanuvium. Son of Marcus Aurelius and Faustina. Carefully educated but chose the society of profligate favorites and common gladiators. Blind to his faults, however, his father gave him the title of emperor when not more than fifteen, and at sixteen he shared the imperial power in every department, except the chief pontificate. On the death of Aurelius, whom he had accompanied in war against the Germans, Commodus hastily concluded peace and hurried back to Rome (180). He there gave himself up to unbounded license, at first, however, in private. Led by a vulgar vanity and carefully protected from serious danger, he displayed his skill in the arena by shooting hundreds of wild animals and meeting in fight numbers of gladiators. He called himself the Roman Hercules and commanded that he should be worshipped as such. Many plots were made against his life, which were several times attempted, and he was finally poisoned and then strangled in December, 192.

[To be continued.]

The Illustrations

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

NEW WING OF THE WESTERN DEPARTMENT-BUILDING, OTTAWA, CANADA. MR. THOMAS S. SCOTT, ARCHITECT.

[Gelatine Print issued only with Gelatine and Imperial editions.]

STORE, CORNER OF TREMONT AND WINTER STS., BOSTON, MASS. MR. J. A. FOX, ARCHITECT, BOSTON, MASS.

THE NEW WING OF THE MUSEUM OF FINE ARTS, BOSTON, MASS. MESSRS. STURGIS & CABOT, ARCHITECTS, BOSTON, MASS.

THE new wing on Dartmouth Street will cover a slightly larger area than the portion already built but will cost less, the difference being as $220,000 to $360,000. This difference is owing partly to the difference in market prices and partly to a change in the material; the terra-cotta of the older portion being replaced in the new with buff brick and Ohio stone.

MONUMENT TO ST. ALPHONSUS DE LIGOURI, CALVARY CEMETERY, BOSTON, MASS. MR. T. O'GRADY, ARCHITECT, BOSTON, MASS.

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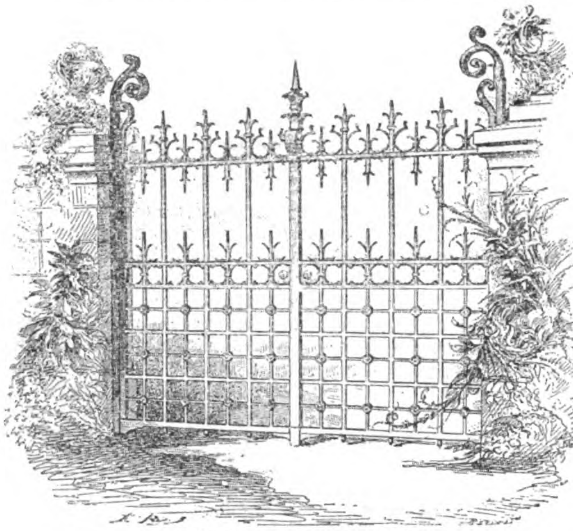
THE cost of this structure above foundations is $4,150.

ACCEPTED DESIGN FOR THE CITY-HALL, CAMBRIDGE, MASS. MESSRS. LONGFELLOW, ALDEN & HARLOW, ARCHITECTS, BOSTON, MASS.

BUILDERS' HARDWARE.—I.



From *La Semaine des Constructeurs.*

THE series of articles which it is our intention to publish under this title, embraces a subject which has a direct bearing upon the work of the architect, and is, at the same time, of vital interest to the builder. The articles are, however, written primarily for the architect. Most builders, we fancy, are already pretty well posted on the subject of the hardware which they are called upon to use in the construction and finish of a house; but our experience has led us to believe that architects, as a rule, seldom go any deeper into the subject than is necessary to decide whether knobs shall be of one material or another, or whether some particular pattern of sash-lock will be satisfactory to the owner. It is needless to say that a more extended acquaintance with the subject would do no one any harm, and might even be conducive to much good, if only in the way of providing more fittingly for the needs of the client. These articles are not intended, however, to be over-critical in their nature, nor necessarily so exhaustive as to embrace all the inventions and arrangements comprised in the general term of builders' hardware, though an attempt will be made to discriminate between what is merely novel and what is really suitable, and so far as possible the best of everything will be noticed under various heads, and an effort will be made to represent as nearly as possible the conditions and limitations of the builders' hardware market, as well as to show what is valuable for the uses of the architect.

It must be remembered that the statements are made from an architect's standpoint rather than from that of the builder or the manufacturer. The object in view is to show what can be obtained for special cases, and how it is necessary to be specified in order that there shall be no doubt in the minds of both builder and client as to what is called for. It is not intended to present abstracts of trade-catalogues, and if the series fails to represent all the wares in their proper light, or at times seems to ignore some valuable inventions or place undue stress upon articles that do not receive the heartiest commendation from those who use them, we can only plead in extenuation the difficulty of finding out everything that is in the market. Many of our best appliances have only a local and limited fame; and as they are advertised sparingly, it is often quite difficult to say exactly that such and such an appliance is absolutely the best.

For example, some Boston dealers consider that the best locks in the country are the hand-made goods turned out by such firms as Enoch Robinson's Sons. Without discussing the peculiar merits of the Robinson locks at this point, the assertion may safely be ventured that any one studying the subject in San Francisco would have as much difficulty in an investigation of Boston hand-made goods as we have had in our endeavors to deal with hundreds of valuable inventions which are hardly known at all in this part of the country. The hope is, therefore, expressed that this publication may call out facts concerning many articles of builders' hardware which at present are unknown to the ordinary trade. Any notes or suggestions relating thereto will be gladly considered by us, for future publication.

It can only be hoped that the series may suggest to architects the possibility of more definite specification, and of some better way of selecting and defining the necessary hardware than to merely insert a clause in the specification to the effect that a certain sum per door and a certain price per dozen is to be allowed in the contract for fixtures. This we know is a very common method of disposing of the question, and is, no doubt, the easiest way out of the difficulty, relieving the architect entirely from any necessity for exhaustive explanations in regard to subjects upon which he generally is not over-well posted. With an honest builder, or with one who has the fear of the inspector before his eyes and knows that all will be scrutinized, this may be a method sufficiently exact to suit most cases; but where the market is so full and there are so many really excellent appliances to choose from, it would seem certainly as if more exact specifications ought to be prepared. How many architects, for instance, ever insist upon a particular style of lock; and how many architects, even after many years experience with the best work, are able to tell a client what is the best sash-lock or what is the best style of hinge, without referring to a trade-catalogue? We cannot hope to meet all emergencies, but it is believed that, at least, a desire for a better selection of hardware than is generally possible can be stimulated.

In these articles the term "builders' hardware" is assumed to include, generally speaking, metal-work of every description entering into the construction and finish of a modern building, from the nails and bolts used in the rough work to the door furniture, and brass lock and plate work of the finish.

The illustrations, which include nearly every article referred to, have been prepared as simply as possible. A great deal of care has also been taken in collecting the prices. The ordinary trade-catalogues are very unsatisfactory in this latter respect: many of them give no prices at all, and when the cost is stated it is always subject to discounts so uncertain and varying as to give absolutely no real information of value to the architect or the purchaser. The prices hereafter given will represent the retail cost of the articles in the Boston market, as nearly as we are able to ascertain it. These prices are, of course, somewhat fluctuating in their nature, but will, at least, serve as a means of comparison even if not exact for all localities and seasons.

In the collection of the subject matter which is to follow, the writer has had the heartiest coöperation from the leading dealers and manufacturers, and desires to especially acknowledge the courtesies of Messrs. Burditt & Williams, and Nichols & Bellamy, of Boston, the Hopkins & Dickinson Manufacturing Co., and the Yale & Towne Manufacturing Co.; without whose technical assistance any such papers would lack the value which it is hoped these will possess.

C. H. BLACKALL.

[To be continued.]

THREE NEW HOUSES AT THE SOUTH END—CHANGE OF GRADE CAUSED BY APPROACHES TO A NEW BRIDGE.—THE LIBRARIANS AND THE CONGRESSIONAL LIBRARY.

DURING the present season the number of really fine residences being erected on Michigan Avenue is greater than in any year for some time past. The extremely rapid growth of the city has already shifted the fashionable quarter so far south that Thirtieth and Fortieth Streets, which but a few years ago were on the very outskirts, are now no longer out of the world, but are quite the central portion of the elegant universe, and some of our finest city houses are being built in this vicinity. On the west side of the Avenue, near Thirty-fifth Street, one of the largest of these residences is now nearing completion, the exterior being practically finished. It spreads over considerable ground, and is fortunate in having a fair-sized yard; the material is a grayish marble—mostly rock-faced—and the architect has shown his wisdom by not having any sides or bays that show from the street built, as so often is the case, of common

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brick, the stone is used on three sides, the brick having been relegated to the rear. At first sight the general outline of the house seems to be extremely agreeable, but the wonderment is, why after looking at it for a time, it does not grow upon one and become more and more satisfactory. This effect must be attributed principally to the mode of treatment, and to the stone itself, which as mentioned above, is a grayish marble. As long as the material is rock-faced the appearance does not call forth any particular protest, but when it is more or less tooled, as on the sill-courses and water-table, then the veins of the marble become so apparent as to be disagreeable, and, in part, at least, account for the disagreeable features of the effect. Moreover, there has evidently been a lack of study of the arrangement of the stone itself: the courses are practically of the same thickness and the blocks of the same size; while the first water-table and all sill-courses are insignificant, giving no particular character to the work. Such carving as there is, has been so distributed in small bits here and there, instead of being concentrated, as to produce no satisfactory impression, while the carving itself is not all that could have been wished. But if all these bad points had been transferred to a house standing at the north about fifteen feet, by comparison with what now exists, they would have been almost worthy of praise for being so nearly perfect. The building in question has, undoubtedly, cost a large sum of money, and is built (on the front) of an expensive red sandstone, but in possessing all the styles of architecture from the Swiss Romanesque of the twelfth century to the fifteenth century Flamboyant of Flanders, it naturally possesses no style at all — except possibly the nineteenth century Wild West of Chicago.

A little farther north on the opposite side of the street is, however, a rather small but extremely charming front which shows an amount of refinement delightful to see. It possesses the quiet ordinary features of a stone bay and a stone porch, but worked together very simply and with remarkably good effect. The stone used is one of our commoner kinds, but unlike the marble it improves by the working, and, moreover, the details of carving have evidently been carefully studied both by the designer and the carver, so that the result is delightful. Aside from the topping-out of the bay-window with boulders and a somewhat awkward stone-railing to the front steps, this front is, by far, the most satisfactory of any in the neighborhood.

For sometime past a new bridge has been building at Jackson Street, across the south branch of the river. This structure is now approaching completion, and the property-owners in that vicinity will be put to great expense and annoyance by the changes in grade necessitated by the approaches. Some of the heaviest storage-buildings in the city are at this point, and nearly all of them will have to be raised more or less. To some of the owners of these buildings have already been awarded damages. One storehouse gets twenty-six thousand dollars, and many others are hoping to get a proportional share. The extremely large and heavy building owned by the McCormick estate is very shortly to be bodily raised seven feet to accommodate itself to this new grade. This is an almost new structure of the strongest class, and is said by the raisers to be nearly twice as heavy as any building in the United States ever before lifted up bodily.

However the architectural profession may feel on the subject of Mr. Smithmeyer and the Congressional Library, the librarians throughout the country do not seem greatly grieved nor show an alarming amount of sorrow for Mr. Smithmeyer, if their sentiments are voiced by some of their number in this city. In view of the present turn of affairs at Washington, it is curious and not uninteresting to quote at some length certain lively selections from a pamphlet published *four years ago* by Mr. Poole, the eminent librarian of this city. The paper appears to have had a rather limited circulation, and was at the time only incidentally referred to in the *American Architect*. The apparently exact fulfilment of some prophecies as to cost is of interest. In explanation it must be said that the pamphlet in question was published in reply to certain criticisms by Mr. Smithmeyer upon a system of library-construction advocated by Mr. Poole in a previously issued paper.[1] On page 29, he says: "It is a singular fact that amidst the superfluity of self-laudation over his own plans and the announcement emblazoned on every page, that in the judgment of a committee of Congress his plans were superior to those of forty-one other competitors, there does not appear the commendation of a single librarian of this or any other country. . . . Mr. Smithmeyer has not quoted the commendation of any librarian, for the reason he could not secure one. The librarians have publicly expressed their views in a series of resolutions unanimously adopted at a meeting of the American Library Association at Cincinnatti, May 26, 1882."

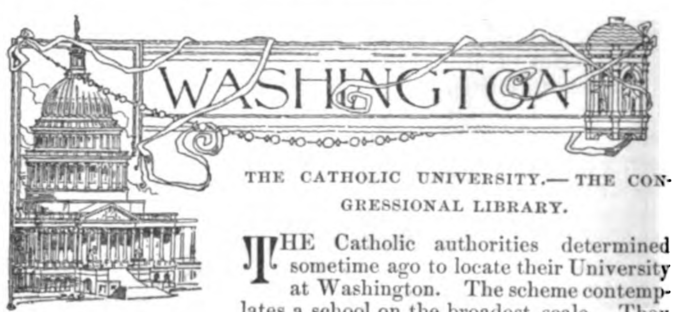
Again, he says: "It is a singular fact that neither in the pamphlet under consideration nor in the paper he read before the American Library Association is there an estimate of the cost of his building, or of its capacity for storing books, and yet Congress is asked to adopt plans and begin the erection of a building without any information on these essential points. . . . The House of Representatives, at the last session of Congress, voted by a decisive majority that the cost of the building should not exceed two millions of dollars. Does Mr. Smithmeyer propose to erect a building on his plans for the sum named? He says nothing about the cost, and for the obvious reason that the sum, if named, would alarm Congress and the country, and defeat his scheme. . . . The estimates of architects who have examined the crude and ill-digested drawings which have been printed vary from ten to twelve millions, and some place the cost as high as fifteen millions of dollars. The objections which the librarians of the country have to the plans are not based upon the needless expense involved . . . but they are based on the fact that the building, when completed, will be wholly unadapted for the uses of a library, and hence be a discredit to the nation. It will be a monstrosity which intelligent Americans will be ashamed of and foreigners will sneer at."

Again, on page 33, he says: "At the last meeting of the American Library Association held at Buffalo, a resolution was adopted urging Congress to take speedy action in the erection of a new building for the National Library, and 'offering in behalf of the Association to furnish any information or assistance in its power which may be called for by the Congressional Committee charged with the consideration of the subject.' The Committee has asked for no such information and assistance, and hence none has been given."

From these quotations it is easy to see that the librarians very justly feel that they have been snubbed and ill-treated by the persons in charge of the plans, and consequently they easily believe the affair a huge swindle, otherwise advantage would have been taken of the offers of assistance coming from men whose lives are spent in managing great libraries, and who would naturally be expected to have some very clear ideas gained by actual experience.

As a result of this treatment they have no great sympathy with Mr. Smithmeyer, and cannot understand the ethics of the architectural profession which would cause architects to stand up for a man whom they consider should have been repudiated, first, last, and all the time.

[1] See *American Architect*, Vol. X, page 131.



THE CATHOLIC UNIVERSITY.— THE CONGRESSIONAL LIBRARY.

THE Catholic authorities determined sometime ago to locate their University at Washington. The scheme contemplates a school on the broadest scale. They intend to erect a divinity, scientific, academic and other schools, having in connection with them a chapel, library and observatory.

The university buildings of which seven are contemplated will be grouped around a central park. The site selected adjoins the beautiful park belonging to the Soldier's Home, and the sites for the different structures have been selected but the plans have been made only for the Divinity School. The Science department will occupy the central space facing the principal avenue. A large church is contemplated on the north between the park and the divinity building; these structures being connected by an arcade.

The observatory will occupy a high knoll on the grounds, and sites are reserved for different colleges to be erected by various Catholic religious orders. The front of the park will be reserved for professors' residences.

In a previous letter I mentioned the fact of Mr. Baldwin having been selected as the architect for the Divinity Building.

This building has a centre 56 feet by 70, with side extensions and wings 170 feet, making the frontage 226 feet. The centre building will be five stories in height with wings four stories. The roof is hipped and covered with Spanish tile. The exterior walls are of blue gneiss, quarried on the Potomac, and trimmed with light Ohio sandstone. The design was certainly inferior to either of the prize designs in the competition. The authorities according to the papers already have in hand between four and five hundred thousand dollars on which to commence operations, and contributions seem to be constantly coming in.

Attention has been called to the Congressional Library by the action of the House of Representatives in attempting to stop the work.

The general impression was that Congress adopted a plan without reference to cost, as the materials and methods of construction at the time of adoption were not decided. The work was put in charge of a commission who were proceeding under this idea, the best material and construction being adopted in every case as advised by the architect. The dispute between the architect and contractors in reference to the quality of cement was the cause of strong and persistent effort on the part of said contractors to displace the architect, and failing in that, to give him as much trouble as a combination of money and Congressional influence could effect. At least, these are the conclusions I, as an outside spectator, have formed. First an engineer was put in as a superintendent of construction, then the House passed a bill to stop the work, but I am pleased to think that the Senate will not agree with the House.

The architect has undoubtedly devoted an enormous amount of time, energy and money to the solution of this problem. In 1872 he won the first competition for the Library. Since that time to the present day, he has devoted himself to the solution of the different problems

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connected with a large library building. He has made sketches or studies in many varieties of Gothic, Romanesque and Classic architecture, variations in plans, etc., for the instruction of the committees of Congress, through the years from 1872 to the present time, besides having made a special trip across the ocean to study the European libraries. In 1886, his plans were again adopted against forty-odd competitors. Architects cannot help but feel a sympathy with him, when he receives such treatment only because he was very careful to procure cement of an extra quality for the foundations of the Library Building and because some members of the House think that they see an opportunity to please their constituents.

Even if the bill did call for a building to cost $3,000,000 complete, which is affirmed on the one side and denied on the other, it has become so much a matter of practice and precedent (a practice never before objected to by Congress, so far as I know) to pass a bill for a public building, placing the estimate at one-half or one-third its actual cost, that there seems no reason why the House should select this special building as a mark for its honest indignation. But the the cement contractors were active and influential, and the presidential election is at hand.

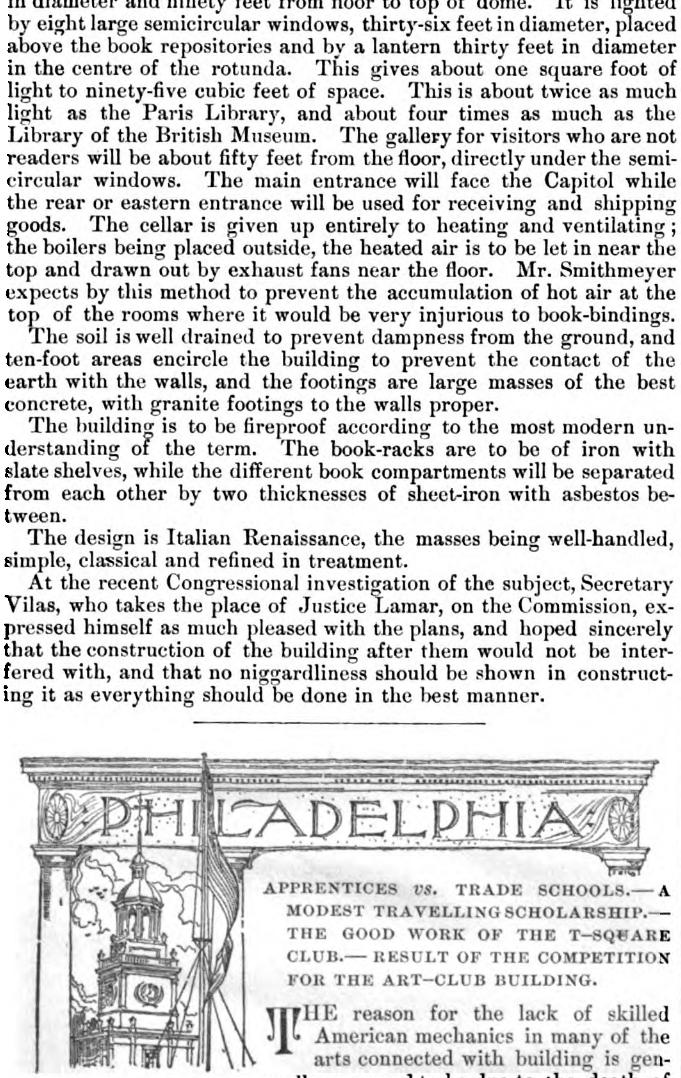
The building will be larger than any building in this city, except the Capitol, fronting on all four streets, and built of stone. By comparison with the other buildings, it would not be reasonable to expect it to cost so little as $3,000,000. The excavations for the entire building have been made and the concrete foundation is already in.

The contracts are let, I think, for the stonework on the western front and rotunda. It is intended to limit the erection to this portion at present. The building is to be quadrangular, 465 feet on the east and west fronts and 332 feet on the north and south fronts. At the corners are pavilions and the central portion is emphasized by an additional story. The interior of the quadrangle is occupied by the reading-room, galleries for books and ten open courts. When entirely complete it is intended to hold ten million books and have show-rooms for copyrighted engravings and other art subjects, a large collection of such matter having already accumulated, as well as rooms for clerical, packing, binding and executive purposes. The reading-room is the principal feature of the building being one hundred feet in diameter and ninety feet from floor to top of dome. It is lighted by eight large semicircular windows, thirty-six feet in diameter, placed above the book repositories and by a lantern thirty feet in diameter in the centre of the rotunda. This gives about one square foot of light to ninety-five cubic feet of space. This is about twice as much light as the Paris Library, and about four times as much as the Library of the British Museum. The gallery for visitors who are not readers will be about fifty feet from the floor, directly under the semi-circular windows. The main entrance will face the Capitol while the rear or eastern entrance will be used for receiving and shipping goods. The cellar is given up entirely to heating and ventilating; the boilers being placed outside, the heated air is to be let in near the top and drawn out by exhaust fans near the floor. Mr. Smithmeyer expects by this method to prevent the accumulation of hot air at the top of the rooms where it would be very injurious to book-bindings. The soil is well drained to prevent dampness from the ground, and ten-foot areas encircle the building to prevent the contact of the earth with the walls, and the footings are large masses of the best concrete, with granite footings to the walls proper.

The building is to be fireproof according to the most modern understanding of the term. The book-racks are to be of iron with slate shelves, while the different book compartments will be separated from each other by two thicknesses of sheet-iron with asbestos between.

The design is Italian Renaissance, the masses being well-handled, simple, classical and refined in treatment.

At the recent Congressional investigation of the subject, Secretary Vilas, who takes the place of Justice Lamar, on the Commission, expressed himself as much pleased with the plans, and hoped sincerely that the construction of the building after them would not be interfered with, and that no niggardliness should be shown in constructing it as everything should be done in the best manner.



APPRENTICES *vs.* TRADE SCHOOLS.— A MODEST TRAVELLING SCHOLARSHIP.— THE GOOD WORK OF THE T-SQUARE CLUB.— RESULT OF THE COMPETITION FOR THE ART-CLUB BUILDING.

THE reason for the lack of skilled American mechanics in many of the arts connected with building is generally supposed to be due to the death of the apprentice system. The contractor (who, by the way, is always a carpenter with us, and not a mason, as is often the case farther North) is, to be sure, nearly certain to be an American; so is the carpenter's foreman, for that matter, the man whom the specifications require to give all necessary measurements to the other workmen and who often supplies most of their brains beside, but most of our carving is done by Scotchmen, Englishmen or Germans: our best stone-cutters are nearly all Scotch, and for many of the trades where a more mechanical kind of skill is needed, foreigners of one race or another are employed because they do better work than the natives. There did not seem to be much hope of improvement for the future either, for the nervous impatience of Americans forbid their articling their sons to one man for a series of years, and the Knights of Labor gave another blow to the already well-nigh obsolete system by limiting the number of apprentices that one man might employ. Realizing the situation and forseeing its possible future evils the master-builders of Philadelphia have determined to establish a trade school. Colonel Auchmuty, who founded the New York Trade School at 1st Avenue and 61st Street, has very liberally promised three thousand dollars a year for three years toward the maintenance of this Philadelphia school which will be modelled very much after the New York one. It will in no way interfere with the manual training now taught in the public schools but will serve rather to supplement it. The course is to be three years and will include instruction in carpentry, brick-laying, plumbing, plastering, stone-cutting and all the trades that are a part of house building. The building public is to be congratulated on this very practical recognition of the paramount importance of the training of the young men who are destined to fill the thinning ranks of our trained mechanics.

If this training of the men who are to execute the actual work of building is all important the necessity for the best kind of teaching for those who are to design these buildings is self-evident. But although what corresponds to the apprentice system among the architects is in high favor and there are no Knights of Labor to limit the number of draughtsmen employed by one man the mere office training that a boy gets leaves much to be desired. The intelligent criticism of original designs, for instance, is a help that a boy rarely gets whose work is confined to an office. The Philadelphia Chapter A. I. A., made a move in the right direction not long ago by establishing what is rather ambitiously styled a "travelling-scholarship prize" of fifty dollars, to be paid each year to the junior member submitting the best competitive design in accordance with a given programme, the money to be used in visiting neighboring cities, noting any good architectural features, perhaps studying plans of new office-buildings or in visiting picture-galleries and the like. The result of the first competition has been most gratifying. The problem was a narrow city front four stories high, to be treated in French or Italian Renaissance. The jury, appointed by the president of the Chapter, were Messrs. T. W. Richards, Professor of Architecture at the University of Pennsylvania, T. Roney Williamson and Lindley Johnson. The successful competitor was Mr. E. C. Kent of Mr. Wilson Eyre's office. Although only eight designs were submitted the average merit of them was so high that at the last Chapter meeting it was unanimously decided to hold another competition in the autumn and if this should prove a success to award two prizes a year hereafter.

Ten, or even five, years ago it would have been impossible to get together anything like so good an exhibition of student work as this in Philadelphia. The enormous advance that has lately been made in architecture is not in itself enough to account for the much greater progress that the draughtsmen of to-day have made, both in design and rendering. To achieve this result a good deal of original designing has been necessary — designing untrammelled by the traditions of the office and the effort to give every drawing the stamp of the master. For the last five years the T-square Club of Philadelphia has given its members the opportunity they needed for this kind of competitive sketching. It is not surprising therefore that the scholarship prize-drawing and its closest competitors should have proved, when the names of their authors were revealed, to be the work of members of this organization. The T-square Club was founded through the efforts of three draughtsmen in Mr. T. P. Chandler's office. Its main object was to promote good draughtsmanship by holding competitions after the manner, in a very modest way, of the New York Architectural League. The Club has had various ups and downs, to be sure, but from the first the excellence of the designs submitted (although these have lately been fewer in number than formerly) has been more and more marked. It is probable that every member of the Club has received permanent benefit from it. If it is good for the draughtsmen to see their designs hung side by side with those of professional architects, these latter are spurred to new exertions in order to hold their place. An excellent feature of the order of business at the meetings is the general discussion on the good and bad points of each drawing, by the members, including the author of the design. In the early days of the club it was often a mystery who this author was; but before long each man's style became so well known that no motto or cipher could hide his identity — unless by chance he happened to have none himself. After the discussion a ballot is taken and the results of the first, second and third choice made known and registered. At the end of the year three prizes are awarded according to the total number of points obtained by each man. The fact that the number of competitive sketches seems to have decreased a little of late may be due to the fact that some of the members, whether rightly or wrongly, consider that their time has become too valuable to be used in making sketches "for fun," and at the same time the club has had very few additions to its list. Applications for membership are by no means wanting, but it is one great proof of the usefulness of such an association as this that

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the standard of excellence in design necessary for admission has been raised or has raised itself by a natural growth, to a far higher level than formerly.

The New Art Club of Philadelphia, with Prof. Wm. R. Ware as its professional adviser, has just brought to a successful close the most satisfactory competition ever held in this city. I might almost say the *only* satisfactory one, for extraordinary as it may seem this is the first of the numberless recent competitions to have the award based on expert judgment. The fact that the Art Club which is composed of artists and lovers of art thought best to call in Mr. Ware's advice is both significant and encouraging. The fourteen architect-members of the club were asked to compete. Only one hundred dollars was to be paid each competitor but the terms of the competition were so unmistakably just and it was so evident from the first that the best plan would be adopted that eleven out of the fourteen accepted. Mr. Ware and the Committee were unable to decide between the five most satisfactory solutions of the problem and yet none of them were quite perfect. As provided for in this case, a second competition was held among these five remaining competitors and the result was the choice of Mr. Frank Miles Day as architect of the building. It will be an immense boon to local architecture if this Art-Club competition can be made to serve as a precedent.

OTTAWA AND HULL. — THE JOGGIN'S LUMBER-RAFT. — COMPETITION FOR THE TORONTO BOARD OF TRADE BUILDING. — AN AUSTRALIAN LAW SUIT. — UNAVAILING SUIT FOR TRAVELLING EXPENSES. — NEW PLUMBING LAW. — NEW BUILDINGS AT MONTREAL.

THE initial illustration is a view of the very pretty Library Building in connection with the Dominion Houses of Parliament at Ottawa, — a library originally for the use of the members, but of which citizens are allowed to make free use. This view of the building, from the northwest, is taken from the "Parliament Hill" at the edge of the precipice, at the foot of which flows the Ottawa River a couple of hundred feet below. Looking to the north and west, a very fine view is obtained of the well-wooded undulating country, streaked here and there by sparkling rivers. The immediate foreground is entirely spoiled by the lumber town of Hull, and the picturesqueness of the river is lost in the masses of saw-dust floating on its surface. From this hill four fearful conflagrations in Hull have been witnessed by thousands of people, the last one occurring a month or so ago, raging almost unchecked through street after street. Four times has it been partially destroyed, and four times has it been rebuilt in wood, ready for the next accident that shall set it alight. There are few traces left of last month's fire, but not one brick cottage has resulted from the repeated outbreaks of fire.

Of Ottawa itself as a city, there is not much to be said. Were it not that it is the seat of the Government, Ottawa would hardly be in existence. The better class of its inhabitants are all more or less connected with the Government Offices. They have their houses, differing in no way from the houses of other places; the principal buildings are Governmental — the three blocks of the Houses of Parliament, the Postal-Department Building, the Geological Museum, etc. Churches there are, but none particularly striking; second-rate shops; bad roads and break-leg sidewalks; the climate very severe, extremes of cold and heat consequent upon the sandy soil and the distance from any sheet of water — this is the sum and substance of Ottawa. Hull is the bugbear of Ottawa, spoiling the scenery, ruining the river, presenting piles of lumber in every direction which extend for miles into the country, and create the chilly blasts caused by the refrigerating properties of piled wood: to these defects must be added the ugly lumber mills with their diabolical saws which cause daily accidents of more or less horrible description.

Mr. Robertson, of the "Joggin's Raft," has recently been to Ottawa about the duties on the logs and the wire-rope used in its construction, and as the former raft which was lost was particularly noticed in this journal, it may interest readers to know about this second venture. It is to be launched[1] at the full-moon tide in July. Its shape is said to be like a huge cigar, six hundred feet long, fifty-three feet breadth, thirty-eight feet high in centre, drawing twenty-two feet of water. It contains twenty-two thousand logs, averaging thirty-eight feet long, eleven and one-half inches butt, six inches end. No less than thirty-three tons of chain are required for binding the logs together, and the whole is valued at $33,000.

The competition for the New Board of Trade Building, Toronto, is now occupying the attention of a goodly number of architects. Some dissatisfaction has been expressed at the arrangement of paying four architects for their designs instead of offering premiums for the encouragement of others. Clause eleven of the regulations has a sentence which naturally makes would-be competitors open their eyes. It runs, "He" (Professor Ware) "will employ a competent person to throw out from consideration all drawings not made in comformity with these instructions." This is a great power with which to invest a person whose name is unknown at present, a power very easily, accidently abused. We all have confidence in Professor Ware's honor and justice, but it seems only fair that the name of his assistant should be made known without delay. The Board of Trade has every intention that this competition shall be carried out in the fairest manner, and as many of their clauses are similar to those issued in the instructions for the competition of the State Soldiers' and Sailors' Monument at Indianapolis, it is expected that the same honorable spirit will pervade their actions to the end.

An account of the competition and subsequent actions of the Committee of the proposed Court-house and City-hall, Toronto, was given in last month's letter, but it appears but little progress has been made since then. An article in a local paper headed: "That long-promised Court-house" says that "Chairman Jones presided over a meeting of the Court-house Committee yesterday morning, at which the contract drawn up between the city and Architect Lennox was presented for approval. City Solicitor Byjar certified as to the legality of the contract, but further than this he would not go. The architect was professionally represented by Mr. George Kerr, by whom exception was taken to the terms of the contract as being too stringent. The plumbing experts appointed to consider this section of the specifications, reported satisfactorily, merely recommending a few minor alterations. A by-law will be introduced on the earliest available occasion and submitted to the people who will be asked, having had every opportunity of inspecting plans and specifications, to pronounce thereon."

So from this it would appear that it depends on the will of the people whether the Court-house shall be carried out or not. As it is three and one-half years since the competition, it must be highly satisfactory to the citizens.

An article of considerable interest to the profession appears in the *Argus*, a journal of Melbourne, Australia, dated April 25, last, and gives an account of an action brought by a lady against a firm of "architects." The judge called in to his assistance a well-known architect, Mr. Lloyd Taylor, whose professional opinion he desired to have to help him in ariving at a conclusion "on certain issues as to the preparation of plans and specifications and the proper supervision of works done by a firm of 'architects, estate and financial agents' in Melbourne, for a lady who was to pay them a commission of two and one-half per cent on the cost of the building they designed, the erection of which they superintended for her." Mr. Justice Williams "dealing with the issues that properly appertained to himself, said that the defence set up; namely, that the defendants were not architects — was almost trifling with the court. It was perfectly immaterial whether they were or were not architects *de facto*, they held themselves out as architects and agreed in writing with the plaintiff to supervise the building for her. The judge gave the plaintiff the damage estimated by her witness, and he said he had grave doubts whether the amount named was sufficient. The plans and specifications were carelessly prepared and the work improperly supervised. The judge trusted the case would be a warning to gentlemen in the defendants' position who held themselves out as architects to delude and deceive people to employ them when they were utterly incompetent to perform the work, and under the circumstances were no more or less than a fraud on the public." The profession is so little understood by men who ought to know better, that it would be well if justices would remember this case as well as these "fraudulent gentlemen." There was a case tried in Montreal not many months ago which is one in point. The architect for the house which was erected in a town at some distance, sent in his account in due time after completion of the works for his five per cent commission *and travelling expenses*, making no charge for time however. The client refused to pay the expenses on the ground that when he had asked what the architect's charges would be, he was told by the architect, "the usual five per cent," nothing being said about expenses, although it was arranged and understood that the architect was to superintend the work. In the evidence it came out that in the case of nearly every visit, the architect had been asked to come up by the client either by letter or telegram. Several architects subpœnaed as witnesses, testified to the custom of expenses being paid by the clients, all to no purpose, the judge giving a verdict for the client, that as the architect had not mentioned "expenses," he was not entitled to them. The expenses and the costs of the action as may be expected, almost swallowed up the commission. Architects at present have to be very careful how they go to law when an opinion expressed by a number of professional men on an entirely professional subject, goes for nothing with a judge.

The new plumbing by-law in Toronto is a good one indeed, and a move in the right direction with regard to examinations for skilled workmanship. All plumbers, masters and journeymen have now to pass an examination to qualify them to hold a city license to carry on their business and do their work. It is an unusually good move and one made not a moment too soon, and if it could only be followed up by a by-law, forcing all owners of houses to submit to an annual inspection of their drains and further forcing them to make any repairs found necessary, we should soon have healthy cities without

[1] This raft was launched successfully July 24. — Eds.

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a doubt. It is taken for granted that the city has done its duty with the mains and outlet, before it calls on plumbers and owners to do theirs. Let us hope for the day when there will be examinations in every trade that affects the health or comfort of those liable to be duped and cheated through incompetent workmen; not every trade only, but every profession also, with special reference to the one we are interested in. Such measures as this by-law would do much to break up the power of the accursed unions.

Nothing further has taken place with reference to the Queen's Park Lease and its forfeiture.[1] The matter has been before the courts but has been relegated to September after the vacation.

A local paper remarks that the new buildings now being erected on St. James Street, Montreal (the principal street) as far as their "beauty and stability" are concerned "would throw discredit upon the capitals of Europe or the great cities of the American Union." Although I am not an American and therefore not likely to be like the Dickinsonian Yankee in my opinion of things in the States, I venture to differ from our local friend's dictum. The New York Life Assurance building, at the corner of Place d'Armes, is progressing, eight stories and a roof, at a cost of $400,000. At the corner diagonally opposite this building, is to be a building of seven stories, for the Imperial Assurance Company, next door to the Bank of Montreal. This Imperial Assurance Building will tower considerably over and dwarf the good proportions of the Bank, and the two monster buildings will entirely spoil the appearance of the little square. But for that, proprietors who mean to make their property pay care little. A considerable sum of money is represented by these buildings, $400,000 for the New York Life, $300,000 for the Imperial, and probably another $350,000 for the Bank of Montreal — $90,000 were recently spent on the alterations of the interior of the latter building. Farther down the street is to be a new building, also seven stories high, at a probable cost of $175,000. This is being built for the corporation of a Methodist church which has just been pulled down on this same site. The ruined appearance of St. James Street is rapidly disappearing and a new street springing up in its stead. The architecture of commercial building of the present day is a study in itself. Although the style is modern, we seem to be borrowing an idea for the worship of Mammon from the Assyrian worship of the heavenly bodies. Seven-story temples seem to be the rage. Personally, I think we might do more in the way of borrowing from them and take a lesson from their coloring propensities. We use more color in our buildings than we did a few years ago, but we might use more with advantage, considering the many colors of the materials at hand. As an investment, this office-building rage is overdoing itself. Only a year ago there were more offices than necessary for the business of the place. Rents for rooms in new buildings were very high, blocks of offices that were expected to bring in seven per cent per annum only brought in four per cent. And now, at the same time, three enormous blocks will be to let.

COMMUNICATIONS

CREOSOTED TIMBER.

BALTIMORE, MD., July 14, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs.— Will you kindly inform us of the process of creosoting wood timbers such as is used in your city by the most of the builders, and very much oblige,

Yours respectfully, O. DUKER & CO.

[ROUGHLY speaking, timber is creosoted by enclosing it in an air-tight tank, partially exhausting the air so as to draw air and sap, if any, from the pores and then filling the tank with creosote oil under pressure. In less thorough methods the timber is simply put to soak in a vat of the oil. The creosoting works nearest to you are at Norfolk, Va., Perth Amboy, N. J., and Wilmington, N. C.— EDS. AMERICAN ARCHITECT.]

READY-MIXED MORTAR.

PHILADELPHIA, PA., July 11, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs.— Will you kindly advise us the name and address of the parties who sell mortar at retail in Germany? Our Mr. J. B. Bowen is in Germany now and we would like him to call on this firm and see how their method works. Your early reply will oblige,

Truly yours, S. BOWEN'S SONS.

[THERE are, we believe, fourteen retailers of mortar in Berlin alone, whose addresses can easily be found in the Berlin directory.— EDS. AMERICAN ARCHITECT.]

A COMPETITION TO AVOID.

OTTAWA, ILL., June 28, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs. — Since writing in relation to the California Court-house, I have received the enclosed "notice to architects" from that point. From information previously received from Redding, it appears that the requirements of the bond is, that the successful competitor is to bind himself that if no bidder is found willing to erect the structure within the estimate accompanying the plans, the architect is to erect it himself at the amount named, in other words, this law, if it exists at all, offers one of the grandest premiums upon rascality ever devised; for I could readily, as the architect of the building, so design it, and arrange the specifications, that while a contractor could not touch it within 20 per cent of the appropriation, I could take it at that amount, and make 20 per cent. It occurs to me, that such a course would be a criminal violation of the general law, which declares, "That no party or person shall act as the agent of two opposite parties in a contract or business transaction; and if such a law exist on the statutes of California, it is void by reason of interference with the general laws of the country; what is your opinion? Respectfully yours, WM. A. YOUMANS, *Architect.*

NOTICE.— Plans and specifications in detail for a Court-House and Jail, to be erected on block 22, in the City of Redding, County of Shasta, State of California. The jail to be constructed adjoining the court-house and connected therewith. The cost of said court-house and jail not to exceed $50,000. The premiums for said drawings, specifications and details accepted to be four per cent of cost of building, said four per cent to include superintendence and travelling expenses. Plans and specifications as above will be received up to 12 o'clock noon, on the 16th day of July, 1888. The Board reserves the right to reject any and all plans. The architect whose plans are accepted will be required to file a bond of $5,000, as required by law. By order of the Board. L. T. DRYDEN, *Chairman.*

Attest: A. F. Ross, *Clerk.*

[WE should say that this would be a good competition to let alone. As we understand it, the plans, details and specifications for the building have to be deposited before the choice is made, and the architect would have little chance of varying them to save himself, in case the burden of erecting the building should be placed upon him. Moreover, as the local contractors would probably combine against him, and he could hardly abandon his own business to go about buying materials and hiring men, it would probably cost him more for the same work than the local contractors would do it for. The provision that the "successful" architect shall be paid four per cent, instead of the usual five, and shall pay his own travelling expenses, has a skinflint air which augurs ill for the happiness of any member of the profession who may enter into a contract with the managers of this particular enterprise.— EDS. AMERICAN ARCHITECT.]

CONCRETE AND IRON.

NEWARK, N. J., July 10, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs.— Will you kindly inform me, if there is published in this country any book on "Concrete" and its use in building generally and particularly as combined with iron, when, for instance, beams are used imbedded in concrete to give strength particularly by means of the adhesion between the two materials. Is not concrete generally more in use in England than here and probably that country is the only place where to obtain a valuable publication of the above mentioned kind? An answer will much oblige,

Yours very truly, INQUIRER.

[THE best thing of the kind we know of is a pamphlet published some ten years ago by Thaddeus Hyatt, a maker of side-walk lights in New York. — EDS. AMERICAN ARCHITECT.]

WHAT ARE OUR ART SOCIETIES?

NEW YORK, July 16, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs.— I wish to obtain a complete list of all the architectural societies, sketch-clubs, artistic bodies and other societies whose objects embrace the promotion of the fine arts. Any aid which you can give me directly through your readers will be appreciated. I will be obliged to any one who will send me addresses of the secretaries of such societies. As a result of this inquiry I will forward for publication a list of societies properly tabulated when the information has been obtained. Yours truly,

F. A. WRIGHT, *Secretary,* Architectural League of New York, 47 Liberty St.

NOTES AND CLIPPINGS

A STORY ABOUT THE CAPITOL AT ALBANY. — Col. Elliott F. Shepard, tells the following story about the New York Capitol at Albany. The building was begun during the war. The plans accepted were on the largest scale. The designs were simply stupendous, John V. L. Pruyn, a well-known character in those days, a Democrat, who was believed to be a copperhead sympathizer, had much to do with the adoption of the plans. He was one of the Commissioners. After the building was well underway, an acquaintance of mine, a Republican, was made a member of the Board of Construction. After looking over the work and studying the prodigious undertaking, he said to Pruyn one day: "How did it ever happen that this building was begun on such a vast scale?"

"I'll tell you," said Pruyn; "I had a notion that the South would be successful in the war; that two Governments would result instead of one. My idea was that New York would want the capital of the Northern Confederation, and if she would build a State-House that would be adequate for a National Capitol she could say to the Confederation: 'Here, take our Capitol, and make Albany the seat of Government.' "That's how New York happens to have such a structure."

[1] Simply because it is anonymous we are not able to publish a communication on Toronto Parks received recently.— EDS.

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SEARCH FOR RELICS OF THE INCAS.— The British consul at Mollendo, in Peru, in his last report states that a limited liability company has lately been formed there, with a capital of about $40,000, called the Compañia Anonima Exploradora de las Hucas del Inca, with the object of searching for antiquities and valuables in the old Inca burial grounds in the district of Cuzco, a concession having been granted to the company by the Government for this purpose. The consul says there is no doubt that many valuable curiosities, and probably deposits of gold and silver, exist in these ancient tombs; but it remains to be seen whether they will pay the cost and trouble of finding. — *Exchange.*

A RUINED CITY IN TEXAS.— The surveys at present being made for the Kansas City, El Paso and Mexican Railroad, at a point north latitude 33 degrees and west longitude 106 degrees, have passed along the lava flow which by the local population is called the Molpais. It consists of a sea of molten black glass, agitated at the moment of cooling in ragged waves of fantastic shapes. These lava waves or ridges are from ten to twelve feet high with combing crests. This lava flow is about forty miles long from northeast to southwest and from one to ten miles wide. For miles on all sides the country is the most desolate that can be imagined. It has been literally burned up. It consists of fine white ashes to any depth which, so far, has been dug down. To the north of the lava flow, and lying in a country equally desolate and arid, the surveyors have come upon the ruins of Gran Guivera, known already to the early Spanish explorers, but which have been visited by white men less often even than the mysterious ruins of Palenque in Central America. Only a few people at Socorro and White Oaks have been at Gran Guivera, because it is at present forty miles from water. The surveyors found the ruins to be of gigantic stone buildings made in the most substantial manner and of grand proportions. One of them was four acres in extent. All indications around the ruins point to the existence here at one time of dense population. No legend of any kind exists as to how this great city was destroyed or when it was abandoned. One of the engineers attached to the surveying expedition advances the theory that Gran Guivera was in existence and abundantly supplied with water at the time the terrific volcanic eruption took place.— *Engineering and Mining Journal.*

THE SOUND TUNNEL.— The question of a tunnel between Sealand and Sweden, under the Sound, had not been heard of for some time till the other day the Royal Swedish Commissioners, who were examining M. Declancle's application for a concession, sent in their report to the Swedish Government. This exhaustive document winds up with the following conclusions: "That a submarine railway between Sealand and Sconia would no doubt insure several advantages to the international traffic, but that, as the building of it would require a very considerable capital, and the paying of the interest on the cost for a long series of years, would necessitate heavy subventions from both the Danish and the Swedish Governments, in addition to the profits of the traffic, which would be inadequate for this purpose, the proposal for this new way of communication be abandoned for the present; that should ever, under altered circumstances, the want or the desirability of a submarine railway come into prominence, it ought to be built on account of the State, either with its own money cr by the aid of capital borrowed for that purpose, and the works should be carried out under superintendence of special commissioners or be contracted away to some accepted person. This arrangement is considered necessary in order to insure to the authorities of these State railways, with which the tunnel would have connection, a proper control of the traffic independent of foreign companies or interests; and finally, that there only, in the last instance, ought to be any question of altogether handing over the undertaking to foreign capital, and that the Government, under no circumstances, ought to tie themselves by entering into contract with private associations or persons before complete plans were forthcoming, and the question of cost fully solved." The Commissioners submit, in conclusion, that M. Declancle's application be not granted. The Government has not yet taken any further steps in the matter.— *Engineering.*

WELDING BY ELECTRICTY.— The Thomson system of electric welding, which we described on page 22 of vol. xliii., is now in operation at the Glasgow Exhibition and is attracting a good deal of attention amongst engineers and electricians. The essentials of welding by this means are (1) a source of electric energy, and (2) a means of transforming that energy into heat at the point where it is desired to locate it. In ordinary practice an alternating dynamo is used. It gives a small current at a high pressure. In the case of the apparatus in operation at Glasgow, which can weld iron from 1-4 inch to 1 1-2 inch in diameter, this pressure is 220 volts. The current passes from the dynamo to a transformer and in a secondary coil of wire composed simply of one turn of heavy copper bar, there is induced a much greater current at a lower pressure. In the apparatus in use the pressure in the secondary coil may be reduced to half a volt. Attached to the ends of this copper bar and in electrical contact with it, are two clamps for holding the pieces of metal to be welded. One of the clamps is movable along a straight axis by a pinion. The parts of metal are placed closely together and held firmly in that position by the pinion; on the application of the heavy current in the secondary coil, the ends become heated, and when sufficiently hot are forced together. The operator has therefore a source of heat as well as a source of pressure easily regulated, so that any metal which will stand the heat necessary can be easily and effectually welded by the process. The exhibitors are the Thomson Welding Company of Boston, and it is shown in the dynamo shed in the space occupied by Mr. Richard Miller, agent of the Thomson-Houston Company in Scotland. — *Engineering.*

A MOVING TALE. — In the laying out of Franklin Park a great many houses had, of course, to be removed to make room for improvements, and they were sold to the highest bidder. One of these was secured by a shrewd son of the Emerald Isle, who immediately bought a piece of land in a desirable locality on which to remove his purchase. When the neighbors heard of his plan they became alarmed, and immediately took measures to prevent it from being carried out. They bought the land of him at an advanced price, and he obtained another lot in an equally high-toned neighborhood. Here he was again given something handsome to relinquish his real estate, and it is said that he kept the house on rollers for a year, making money all the time by selling the sightly spots on which he proposed to put his dilapidated shanty. Unlike Poor Joe, this individual became prosperous by "moving on." — *Boston Saturday Evening Gazette.*

TRADE SURVEYS

THE outflow of British capital into foreign countries, especially to the Western hemisphere, is increasing, and finds chief employment in national, State and municipal bonds and in railroad securities. A vigorous effort is at the same time being made to build up and extend British foreign trade on this side of the water. This is due partly to the failure of the British interest to maintain its hold as firmly as desired on European and colonial markets. The Germans are more or less successfully contesting for this trade, and hence the outflow of British capital and enterprise into new regions on this side of the Atlantic, where land is cheap and opportunities abundant. The effect so far has been to maintain a more uniform industrial and commercial activity. This outflow of money, supplemented by an increasing outflow of brain and brawn, is steadily broadening the foundations of industrial activity. Statistics, especially those relating to financial matters, reveal the very interesting fact that the markets of the outside world are rapidly increasing their requirements. A new epoch is at hand, and money-lenders and leaders in transportation are preparing to take advantage of the opportunities presented. It is no prophesy whatever to say that a moderate depopulation of the more crowded countries of Europe will take place, or rather, set in, during the next ten years. The talk of a disarmament is simply the result of a financially bankrupt condition of several of the European powers. The pressure upon the peasantry of Europe is becoming too serious to be endured, and the trans-Atlantic attractions are threatening to inaugurate a movement directed to a greater or less equalization of population between the old and new worlds. It is the contemplation of this that is helping the outflow of capital and stimulating a vast number of industrial and engineering enterprises in the Western hemisphere. A list of enterprises involving the expenditure of over one million dollars each that have taken root within the past three or four years would exceed an hundred. The completion of one or more of the isthmus enterprises will give an impetus to this force. Its magnitude is dimly comprehended. It will have a mighty influence on North American affairs and will make the maritime interests of these States second only in the world. Capitalists are foreseeing these possibilities and will be found ere long in possession of the most desirable advantages and properties and franchises. The breaking away of the world's millions from their old haunts is the next great move on the world's checkerboard. The industries of the United States will profit most by the expansion and ship-building, now in its infancy, will become an important industry. This is no pen-picture or piece of random writing, but is based upon facts and foresights and deeply-rooted purposes of those who have long purses and long vision of coming events. The foundation of this growth has been extending ever since 1873. The first step was taken by the doubling of the volume of our circulating medium. The second is being taken by the depression of prices and the amalgamation of similar commercial, manufacturing and other interests. As heretofore stated, one of the pressing problems will soon be the formation of a new and broader national banking system, but the necessities are not yet sufficiently pressing. The railroad people are switching themselves for building so much railroad, but in this they have rendered an invaluable service in opening up vast new regions, the effect of which on the country at large has been and will be to prevent one of those dangerous appreciations in the value of real estate and farm lands and lumber and mineral lands which are constantly threatened by our rapid expansion. The reckless enthusiasm of our railroad-builders is our safety. But for it railroad combinations would be possible which are now impossible, and freight rates would be high and oppressive where they are now low and reasonable. But with all our rapid progress there is a temporary over-supply of money, and this volume of caged energy will burst its way into activity to the advantage of labor and enterprise generally. An equalization of profits is going on at the same time in the old and well-defined industries and avenues, but enormous fortunes will be built up in the newer regions, where the world's millions will seek new homes. The existing trade conditions are all favorable. Traders and speculators regret the decadence of large margins, but the off-setting advantage is a broader and more permanent trade, a more regular manufacturing activity, and even prices year in and year out. The present, to many, threatening trade combinations are simply the quotient of the forces at work in the commercial world, and this combination must continue in the nature of things. As storms sometimes do harm, so also may these rapid combinations deal out injustice temporarily, but the outcome is safe and only good results will be reached. The spinning-jenny is set aside by more complex machinery, but it is only recently that analogous changes have been effected in commercial and transporting interests. Every advance in this direction is marked by permanently lower prices These combinations are simply breaks. The immediate trade outlook is sufficiently encouraging. Prices have apparently reached bottom. New business is backward. Large enterprises are projected. The South is absorbing from ten to fifteen millions of nominal capital per month and the far Southwest is attracting miners and manufacturers in order to supply demands that are arising on the Pacific Coast and in the great interior west of the Mississippi. The salient features are: guarded production in all the industries, declining transportation charges, increased construction of lake and river craft, and increased cultivation of the soil, especially among small farmers and planters. So far as tariff changes are concerned, the country is not half so afraid of them in fact as they are in the abstract. The people are willing to sit down and slide a few steps towards freer trade, but they have no notion of getting too near the edge. They see no other practical means of correcting what they regard as the monopolistic tendency of the hour. The adaptiveness of the American character will be demonstrated under any conditions with what it is accidentally or purposely surrounded. Our growth in manufacturing for twenty-five years has been extraordinarily rapid and at the expense of development in other directions. This will be corrected and that too without the breaking up or down of any manufacturing interest whose existence is necessary to the country.

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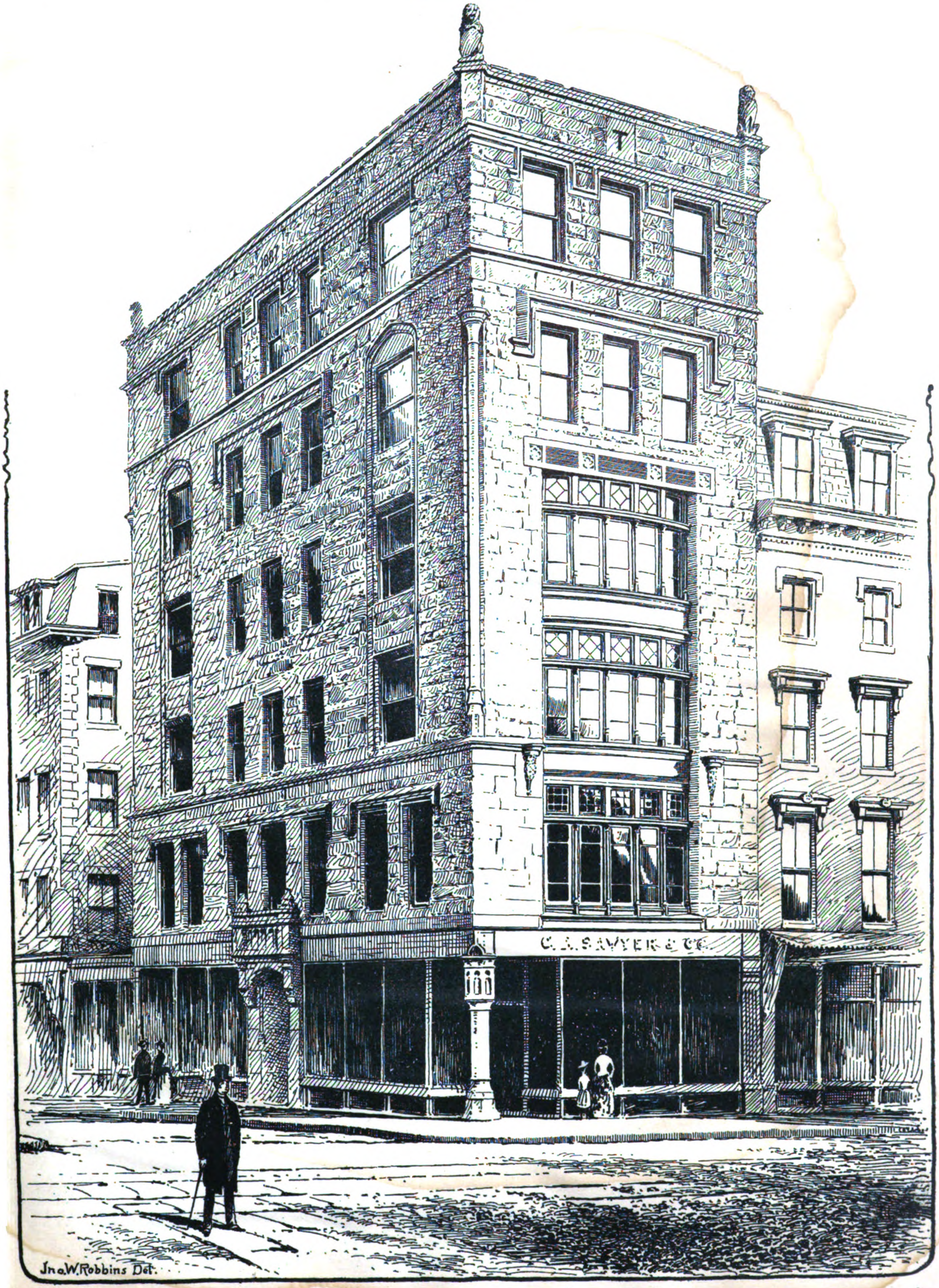

BUILDING ON CORNER OF TREMONT AND WINTER ST'S BOSTON. JOHN A. FOX ARCH'T.

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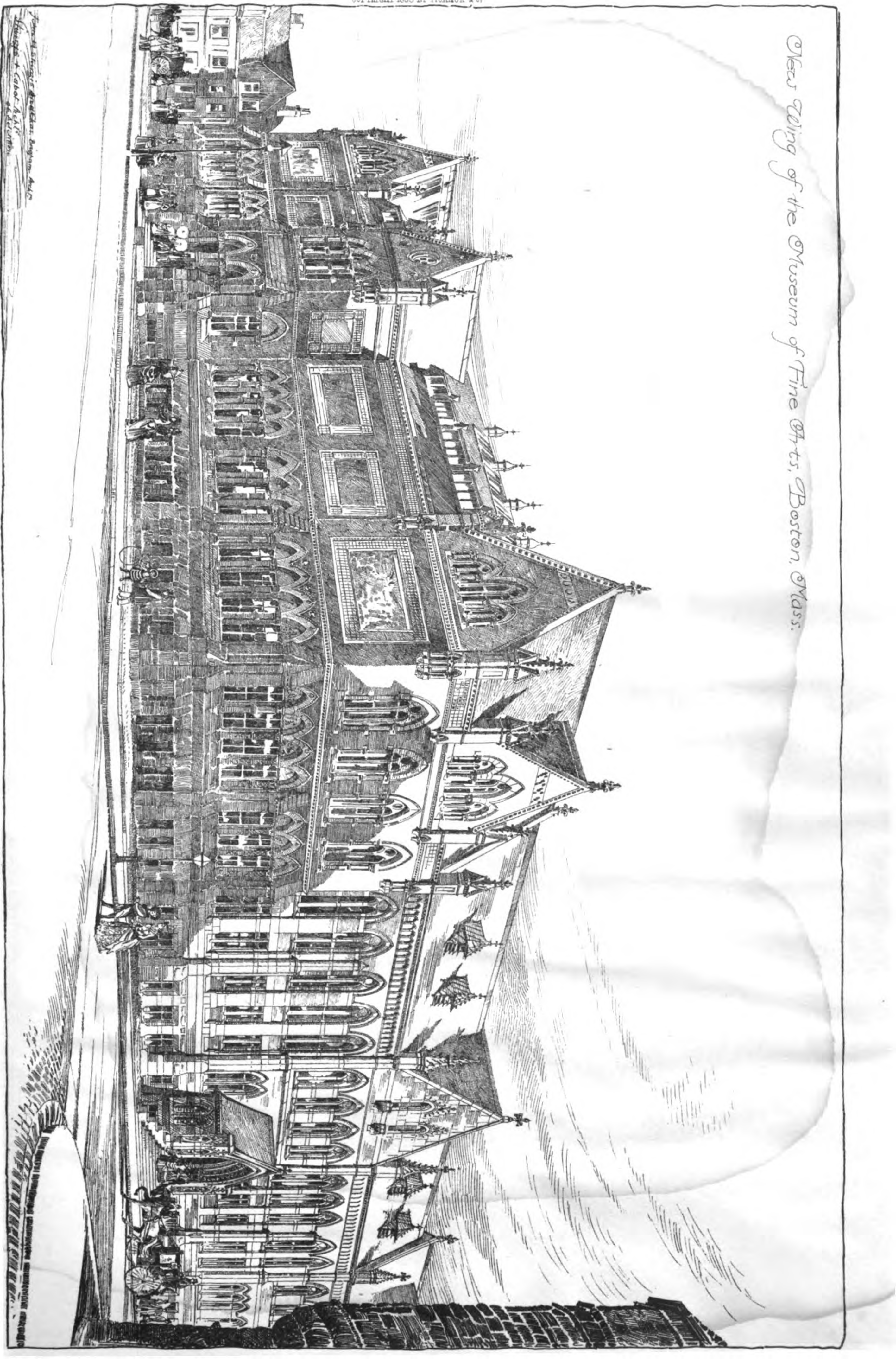

New Wing of the Museum of Fine Arts, Boston, Mass.

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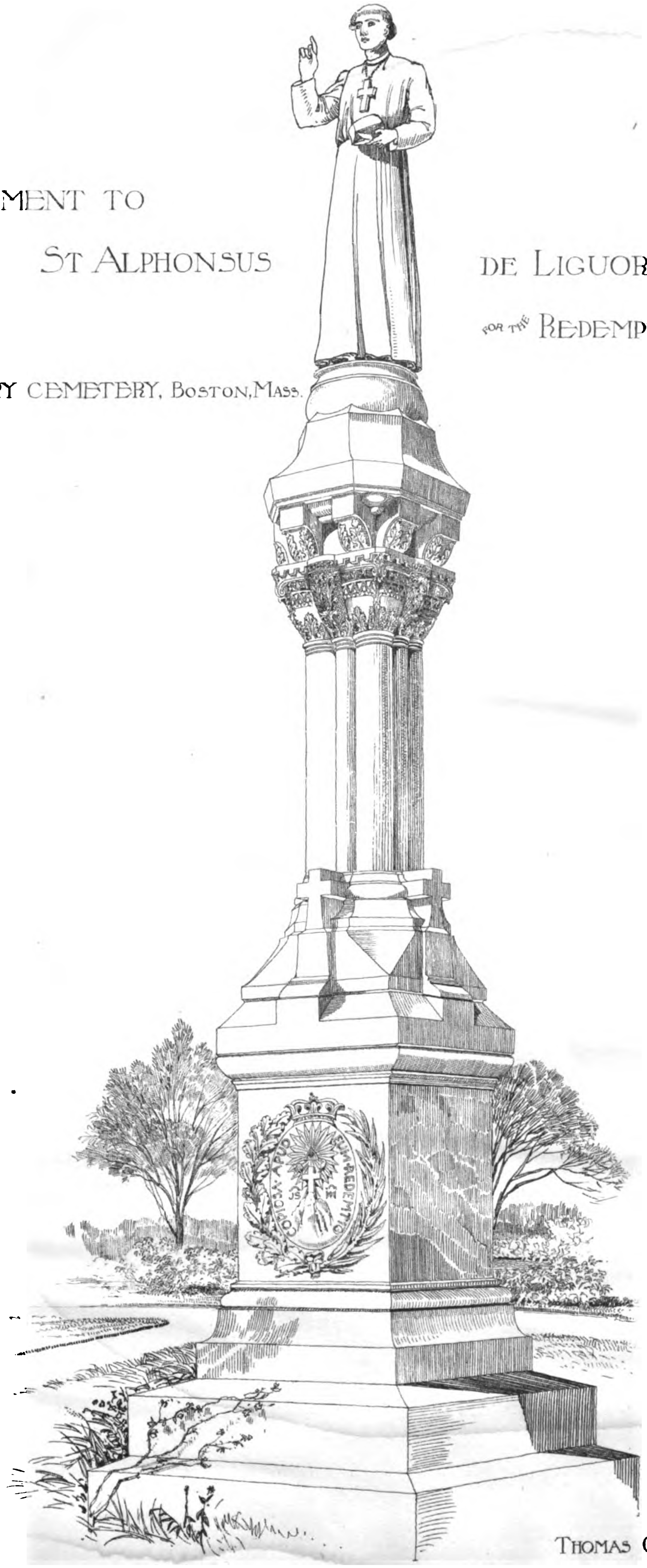
Monument to St Alphonsus de Liguori for the Redemptorists' Order.

Calvary Cemetery, Boston, Mass.



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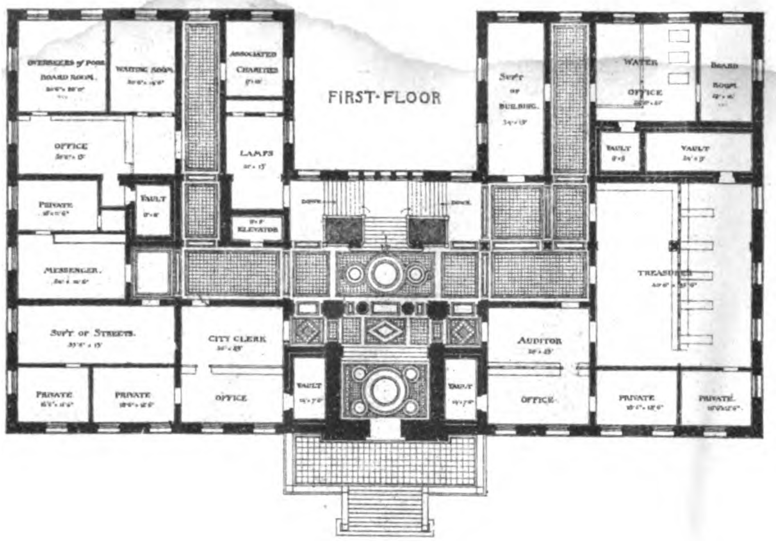
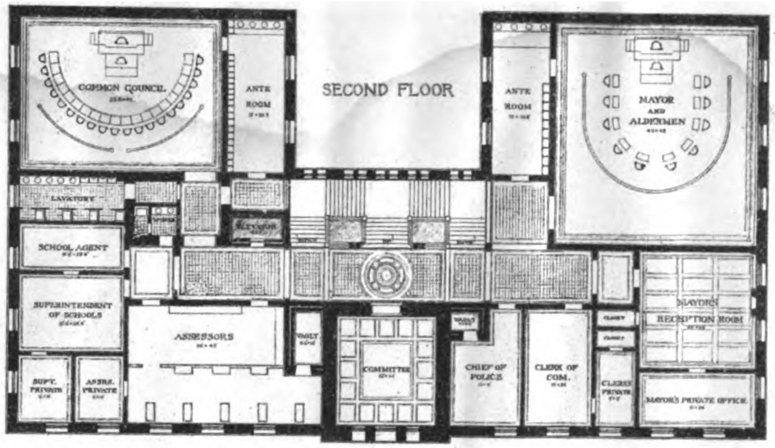
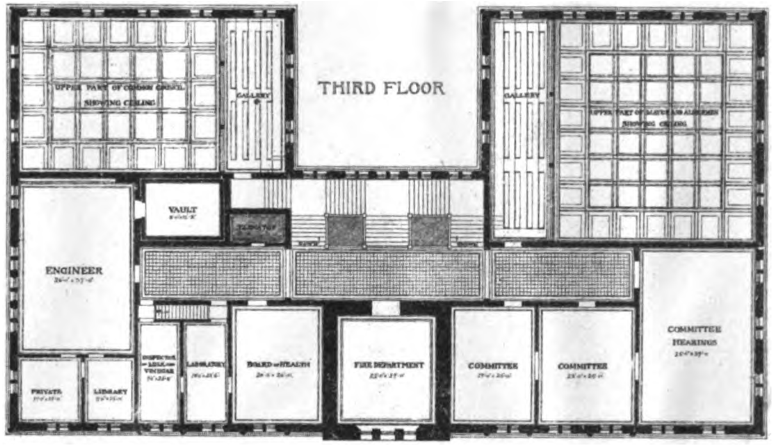




·LONGITUDINAL·SECTION·



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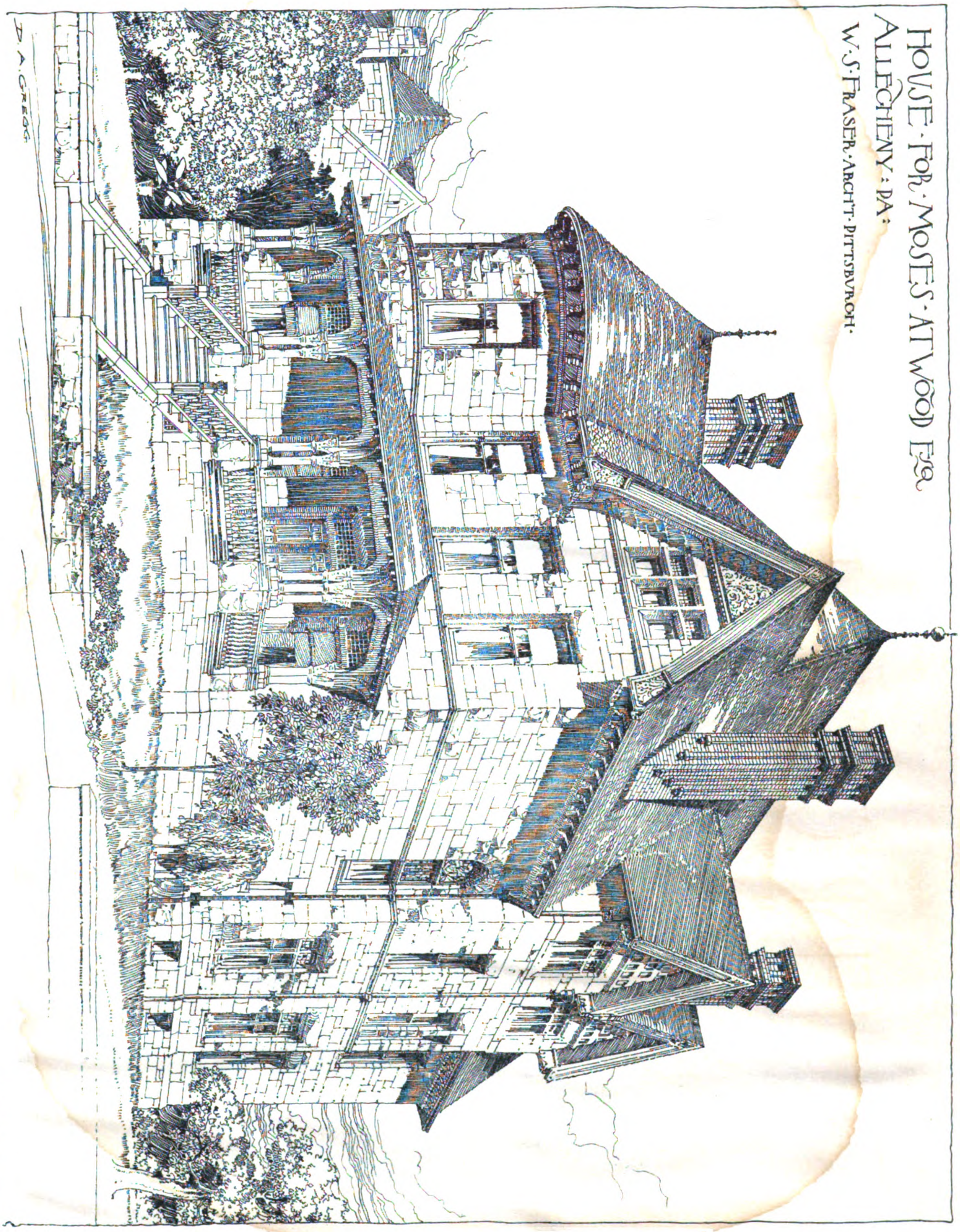

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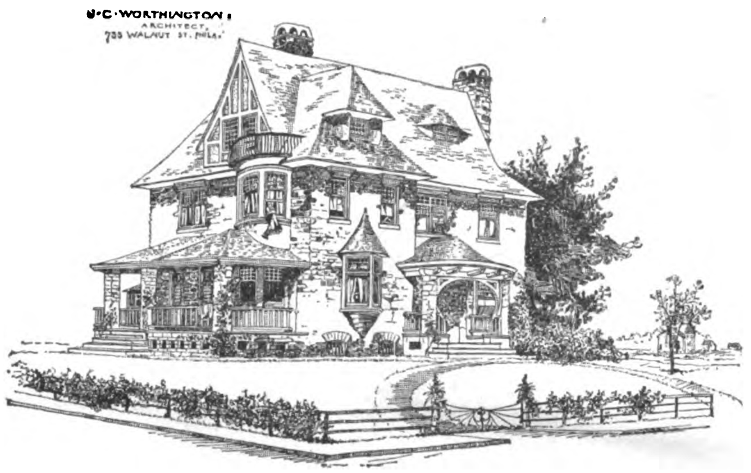

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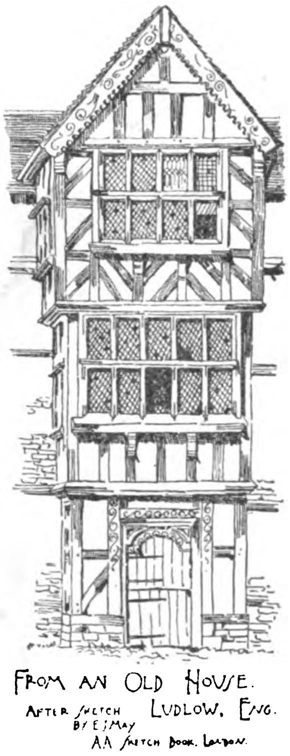

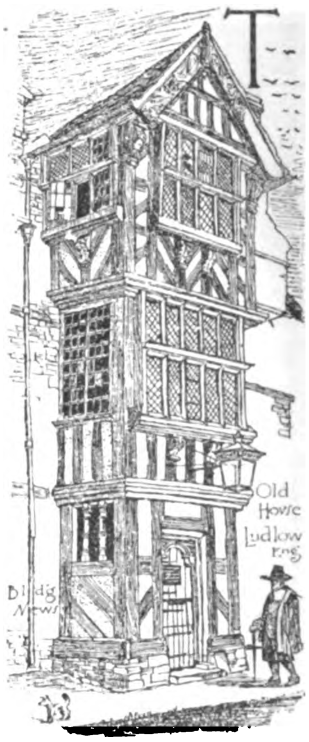

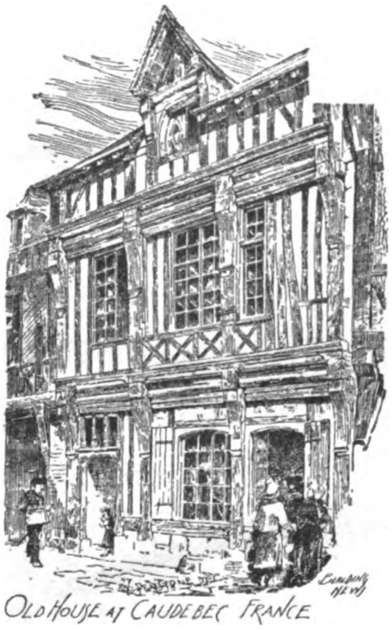

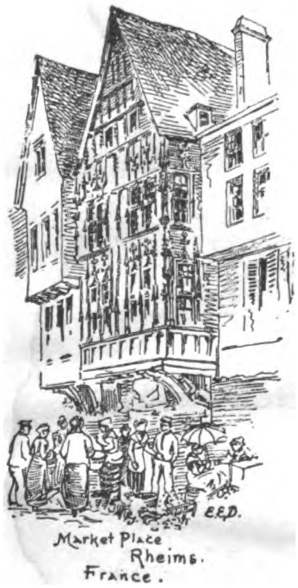

HALF-TIMBERED HOUSES.

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The American Architect and Building News.

Vol. XXIV. Copyright, 1888, by Ticknor & Company, Boston, Mass. No. 658.

AUGUST 4, 1888.

Entered at the Post-Office at Boston as second-class matter.

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THE *British Architect* has, as we believe, done a serious injustice in commenting on the correspondence published in these columns some weeks ago, under the heading of "Chances for the Morally Infirm." Our readers will remember that a correspondent sent to us for publication a number of letters from manufacturers and dealers, offering discounts, commissions or perquisites to architects who might specify or order their goods. As an offset to this another firm published a letter from the original correspondent, inquiring its "lowest possible discount to architects." The *British Architect* says that "There is, of course, only one construction to be put on such a letter," and goes on to argue that the fact that dealers offer unlawful inducements to architects to use their goods is a proof that such inducements are not only "readily accepted in many cases," but are in many others "demanded as a rightful perquisite." Now, without referring to the particular case in question, we must express our conviction that the *British Architect* is wrong in supposing that "only one construction" can be put on a letter like that quoted; and that just such letters are written every day by architects, not only with the purest intentions, but from a conviction that their duty to their clients obliges them to do so. In the first place, we are sure that the great majority of decent architects regard the whole system of concealed discounts and commissions as an unspeakable nuisance, and regard with loathing and contempt the ideas of business which permit manufacturers to offer them, and to try to allure as customers the creatures who accept them. Nevertheless, the system exists, and architects must do best they can with it. The easiest way would be to certify for the "list," or "long" price for everything which their customers have to pay for, justifying themselves by comparing the printed price-list with the charge on the bill, and washing their hands of all endeavor to inquire whether this is the real value of the article. Unfortunately for the conscientious and pains-taking architects, they soon discover that the list-price and the real selling-price of the goods used in building are two very different affairs, and that, while the amount of discount is studiously concealed from persons not connected with the business, the architect who does not contrive to discover it, and who pays the "long price" for what he buys, or orders for his client, is looked upon by the dealers as a fool, while, even if his client does not discover that the goods might have been had cheaper, and reproach him, he is troubled by his conscience for not having made due effort to save his employer's money.

IF the discount were a trifling one, the matter would not be worth spending much time over, and architects might certify bills by the simple process of comparing them with the price-lists, and save an immense amount of time and temper; but in many cases the difference between the true and the ostensible price is enormous, while strenuous efforts are made to conceal it from architects and their clients. We once had a bill to certify which we knew was too large. We went to the dealer, who was at heart an honest man, and were informed that there was a regular discount on those goods of sixty per cent. We asked him to make a note of the deduction on the bill, so that it could be certified; but he refused, saying that the dealers never allowed the discount to appear on the bill, but that if we would get for him a check for two-fifths of the face of the account, he would receipt the bill in full. In this case, as in most others, the discount was strictly confined to dealers and architects, and could only be allowed to them, persons outside the trade being, in theory, always required to pay the full price. In many instances, where the discounts are very large, the rule in this country is not to allow them on a bill sent to an architect to certify, unless he will consent to have the bill made out to himself; the explanation usually given being that the dealer is bound to "protect" his agents, or customers who buy to sell again, by selling nothing to "outsiders" below the list-price, and that in order to escape the penalties attached to an infraction of this rule, it is necessary to be able to show other persons in the trade that the sale was really made to the architect, who ranks in theory as a general agent for the sale of all sorts of building-materials. After a few years' experience by this method of doing business, in which the architect can often buy the goods that his client wants for less than half, or as we have known, less than one-third the amount that would be charged on a bill sent directly to his client, and can almost always secure a large reduction from the ostensible price, many architects save trouble in trying to ascertain the cost of such articles, by inquiring directly the "price to architects," or the "architect's discount," instead of wasting time in consulting price-lists which they know are intended simply to deceive. Most architects of large practice, who, as all architects are sometimes obliged to do, purchase materials for their buildings directly, instead of specifying them, and letting the contractors settle the bills, can save considerable amounts for their clients in this way, and feel themselves bound to do so; and the idea of the *British Architect*, that, when an architect asks a dealer how much cheaper goods will be sold to him than to his client, it is necessary to infer that he intends to steal the difference in price for himself, strikes an American as ridiculous. It is hard enough for architects to be obliged to spend their precious time in finding out how to get things at their value for those who trust them, without being accused of corrupt intentions, and we venture to say that most decent members of the profession would be considerably better off at the end of each year if "trade discounts" were by law either abolished or fixed at a reasonable amount. Of all the provoking experiences of an architect's office, the worst is to be told by a contractor in handing in his estimate, "that twenty per cent goes to the architect," or "twenty-five per cent of this is for you," or to have, as in one instance in our experience, a check for five thousand dollars, to the architect's order, laid down quietly in a conspicuous place. The architect's first impulse is to kick the contractor and his check down stairs; but his next thought is for his client. If the contractor, who is often in these cases the lowest bidder, can afford to do the work, and spare, out of his profits, a douceur of twenty or twenty-five per cent to the architect, is it not the latter's duty to his client to save this amount for him? In most cases the architect immediately deducts the discount from the tender, and persuades the contractor to sign an agreement for the net amount; but contractors often refuse to make any discount unless the architect receives it, and the latter is sometimes reluctantly compelled, by what he conceives to be his duty, to accept it, and hand it over to his client, generally with a resolve to have no further dealings with that contractor.

BOSTON has long been afflicted with a very tyrannical and arbitrary society of a trade which is noted for its domineering habits, — that of the freestone-cutters. For many years the Freestone-cutters' Union has interfered with the business of contractors, interrupted the progress of buildings, and hunted non-Union men like rats, without finding any one brave enough to resist its dictation. Early last year, however, one of the oldest and best contractors in the city, Mr. Carew, happened to take into his shop a printer, who wished to try his

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hand at stone-cutting. He was slow and awkward at first, but Mr. Carew paid him what his work was worth, and the man was not only satisfied, but grateful. The managers of the Union, however, saw a chance to make trouble, and gave notice that the printer must be paid full stone-cutter's wages. This obliged Mr. Carew either to pay his man more than he earned, which neither of them thought fair, or to turn him off altogether, which might be fair, but was an injury to the man which Mr. Carew disliked to inflict. He accordingly declined to obey the managers' commands, and his men were called out. Being a person of considerable courage, and fortified also by a thorough knowledge of his business, and a high reputation for honesty and skill, Mr. Carew resolved not to yield, and began immediately to take measures for filling his shop with non-Union men. The Union fought hard, but he availed himself of the opportunity of taking as many apprentices as suited him, instead of restricting himself to the small number allowed by the Union dictators to their subject masters, and by his own exertions, aided by the free men whom he gradually gathered around him, he fulfilled his contracts. The next step was to get workmen from abroad, and by the end of a year from the time of the strike he found himself with a full equipment of excellent men, working at good wages, and not bound by oath to try to destroy his business at a signal from a scheming demagogue. On finding that their bullying had not worked as they thought it would, the Union managers next resorted, as usual, to sneaking and whining. One night Mr. Carew's shop was broken into, and all his tools taken to the edge of the wharf, and thrown into the harbor. Then followed libellous attacks in the newspapers, which were persuaded to say that Mr. Carew had put bad work into the stone furnished for one of the city buildings. Fortunately, his reputation enabled him to laugh at these attempts to injure him anonymously, and he replied, with considerable force, that as the men who were attacking him were the ones who did the work on the building in question, whatever bad work was done must have been done by them.

IN another column will be found some account of the curriculum followed in the architectural department of the Massachusetts Institute of Technology which was prepared some weeks ago and consequently has not been quite brought down to date. Since it was written Professor Clark has retired and has been succeeded by Mr. F. W. Chandler, the first-named gentleman resuming the practice of his profession which had been partly interrupted by the demands made on him by the work at the Institute, while Mr. Chandler on the other hand abandons — for the present at least — all active architectural practice to devote himself entirely to his new work. For ten years or more Mr. Chandler has been associated with Mr. E. C. Cabot, passing to that office from the office of the Supervising Architect at Washington where he was for some time head-draughtsman during the incumbency of Mr. Mullet. Before this he had been for several years in the office of Ware & Van Brunt, and during this time he spent at least one year as assistant to Professor Ware in the early years of the evolution of the department at the Institute. So he takes up the work not only as an architect of thorough training and much practical experience but also as one who has already had experience in the task of training adolescent architects. In deciding against making the attempt to "ride two horses" as both his predecessors have done, Mr. Chandler decides most wisely. There is enough to be done in such a place to occupy a man's full time, and the chances of the department becoming such a school of real architecture as the times demand is greatly increased by his decision on this point. But unless the trustees and the government of the school experience a change of heart there is little hope that the grade of work can be carried far above its present level. For years this department of the Institute was the only one that was not carried on at a loss, but instead of being treated with more generosity on this account it was considered as a sort of nursing-mother to the other departments which could not support themselves, and the library and collections which might have been paid for out of its own income were obtained through private aid, and even at this day they are, for a department which has been in successful operation for nearly twenty years, ludicrously inadequate. As an adjunct of a school of applied science the department is out of place; it ought rather to be associated with the School of Drawing and Painting at the Museum of Fine Arts. Mr. Chandler has our hearty good wishes and sympathy, and we feel he will need this, for we cannot believe that he shares the belief of the authorities of the Institute that architecture is only "an industrial art."

A MYSTERY still seems to hang about the competition for the new Episcopal Cathedral of New York. So far as we can ascertain, the competition is to be a limited one, but the accounts of the degree of limitation differ widely. According to one newspaper item, several American and a certain number of English architects have been, or are to be, asked to compete, while a later account says that twenty architects of New York have been invited; and it seems to be uncertain whether the time for terminating the contest is to be December 15th or 31st next. A curious provision in the invitations is said to be that the church shall face the south. Whether this means that the principal entrance shall be by a south porch, as, for instance, at Chartres, or that the usual orientation shall be abandoned, on account of the topography, or for some other reason, we cannot say, but hope that the public may be allowed later to know more of a subject which has excited such general interest.

THE San Francisco Chapter of the American Institute of Architects has now in hand the subject of Competitions. The matter is in the hands of a special committee, which has not yet made its report, but, as we learn from the *California Architect*, an informal discussion took place upon it at the last meeting of the Chapter, and some curious facts were mentioned. One member described a case where competitive designs were invited for a large public building. Eleven sets of drawings, comprising seven sheets each, were received, and opened by the committee in charge. In an hour after the plans were open, the award was made. As the narrator pointed out, it was impossible that seventy-seven drawings should have been examined, even hurriedly, in one hour by a committee, and the inference could only be that the "successful" competitor had been decided upon beforehand. We have heard of a committee-man who, in a similar case, was asked why other architects should be induced to spend time and money in making drawings in competition for a commission which had already been promised. He answered, very innocently, that the committee thought it would be well to get the ideas of other architects, as they might be of use to the young man who was going to do the work; and this is very often the sole object of the so-called competitions managed by laymen. According to the San Francisco architects, at least ninety per cent of the public competitions which take place on the Pacific Coast are of this character, but, as the best part of the profession there has taken the subject up, we may hope that a reform will be brought about before long.

SOME extraordinary building operations are just now going on in Chicago. The structure known as the Old Chamber of Commerce has been purchased by a firm of lumber dealers, and is to be converted into offices, by the curious process of addition at top and bottom. The present building is three stories high, the upper story consisting of a large hall. This is to be divided horizontally into three stories, by the insertion of two floors, and seven stories more are to be added above, making twelve stories in all. As the present foundations are altogether inadequate to the support of this weight, they are to be removed from beneath the new building, and heavier ones inserted. Meanwhile, the superstructure will be supported on three thousand jack-screws. The architect in charge of this remarkable operation is Mr. Frederick Baumann, whose name is enough to indicate that it will be thoroughly and skilfully carried out. In another part of Chicago a large office building is to be raised six feet, to accommodate it to a new street grade. This will also require about three thousand jack-screws, although the work itself is much simpler than in the other case. It seems as if some of our building raisers, whose fame is world-wide, might with advantage extend their business to the other side of the ocean. In a profession where so much depends upon experience, and the skill that comes by practice, they would for a long time surpass all others, while they might in their turn find something to be learned, in England, for instance, where the restoration of a tower to the perpendicular, by lifting one side of the foundation, an operation as yet untried, we think, in this country, was successfully accomplished a few months ago.

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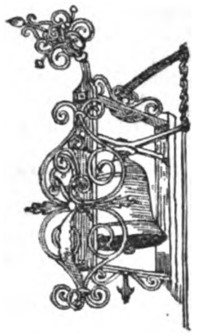
ARCHITECTUAL EDUCATION IN THE UNITED STATES.
I.

THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY.



THE Institute of Technology was the first school in the country to open a regularly established department of architecture which has been sufficiently prosperous to maintain itself. The charter of the institution was granted by the legislature in an act dated April 10th, 1861. The School of Industrial Science was opened in February, 1865, and the Department of Architecture was created in 1866, though there were no regular graduates until 1873. William R. Ware, an architect of Boston and an ex-pupil of Mr. R. M. Hunt of New York, was placed in charge of the department, and continued as its head until 1881, the high standing of the Institute being largely due to Prof. Ware's personal influence, and his untiring and enthusiastic work. He raised the department from nothing to the first rank in the country. On being called to Columbia College, New York, he was succeeded for a time by W. P. P. Longfellow and T. M. Clark as associate professors. Prof. Longfellow, however, retired from the department at the end of a year. Prof. Clark had studied or worked with Mr. Richardson for some seven years and was employed in the building of Trinity Church, Boston, and several of Mr. Richardson's — or more properly Gambrill & Richardson's large works. Both Prof. Ware and Prof. Clark have been ably seconded in their efforts by the work of an assistant, Prof. Eugène Létang, who was brought over from Paris in 1872, through the efforts of Prof. Ware and has practically had control of the architectural designing and drawing ever since, and has contributed very largely to the popularity and success of the department. Prof. Clark has also two assistants, Mr. Homer and Mr. Perkins, who give lectures and supervise the drawing classes, besides a few special lecturers who will be referred to later on.

The courses of study in the Institute are very strictly laid down in the curriculum, and students are not allowed to depart from them. The regular course extends through four years, but, as in nearly all of the architectural schools in the country, it has been found that a great many students are not willing to give so much time to the study of architecture, and a special course has been provided, extending through two years. A large majority of the architectural students content themselves with this course instead of following the more extended one.

The special course as laid down in the catalogue is as follows: —

FIRST YEAR.

FIRST TERM.	SECOND TERM.
The Orders and Elements of Architecture.	Original Design.
Sketching and Water-Color.	Sketching and Water-Color.
Mechanical and Free-hand Drawing.	Mechanical and Free-hand Drawing.
Materials.	Shades, Shadows, and Perspective.
Elementary Mechanics.	Common Construction.
Architectural History.	Graphical Statics.
	Architectural History.

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Original Design.	Original Design.
Sketching and Water-Color.	Sketching and Water-Color.
Specifications.	Specifications and Contracts.
History of Ornament.	History of Ornament.
Problems in Construction.	Planning.
Ventilation and Heating.	Iron Construction.
Working-Drawings and Framing.	Schools, Theatres, Churches.
	Ventilation and Heating.
	Surveying.
	Stereotomy.
	Problems in Construction.

The regular course is the same for all departments of the Institute during the first year, and is confined to general studies, with the single exception of a large amount of mechanical and free-hand drawing. No one is allowed to continue in the department of architecture who does not have credits in mechanical drawing, including geometrical drawing, shades and shadows and descriptive geometry.

The regular course is as follows:

FIRST YEAR.

FIRST TERM.	SECOND TERM.
Solid Geometry.	Algebra.
Algebra.	Plane Trigonometry.
General Chemistry.	General Chemistry.
Chemical Laboratory.	Chemical Laboratory.
History of the English Language.	Political History since 1815.
English Composition.	French (or German).
French (or German).	Mechanical and Free-hand Drawing.
Mechanical and Free-hand Drawing.	Military Drill.
Military Drill.	

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Materials.	Original Design.
Architectural History.	Common Constructions.
Drawing.	Architectural History.
The Orders and Elements of Architecture.	Shades, Shadows, and Perspective.
Analytic Geometry.	Sketching.
Physics.	Differential Calculus.
Descriptive Geometry.	Physics.
Political Economy.	English Prose.
German.	German.

THIRD YEAR.

FIRST TERM.	SECOND TERM.
Original Design.	Original Design.
Sketching and Water-Color.	Sketching and Water-Color.
Working Drawings and Framing.	Iron Construction.
Lectures on Fine Art.	Kinematics and Dynamics.
Integral Calculus.	Strength of Materials.
General Statics.	Stereotomy.
Structural Geology.	Physical Laboratory.
Physics: Lectures and Laboratory.	European History.
German.	German.
	Acoustics.

FOURTH YEAR.

FIRST TERM.	SECOND TERM.
Advanced Original Design.	Advanced Original Design.
History of Ornament.	Sketching in Water-Color.
Sketching in Water-Color.	Planning.
Problems in Construction.	Schools, Theatres, and Churches.
Specifications.	Problems in Construction.
Strength of Materials.	Specifications and Contracts.
Lectures on Fine Art.	Constitutional History.
Heating and Ventilation.	Heating and Ventilation.
Advanced French.	Advanced French.
	Thesis Work.

The two-year special course thus includes the mechanical and free-hand drawing of the first year of the regular course, the drawing and design of the regular second and third year, and the more strictly professional lectures of the second, third and fourth years, with a practical course of its own in trigonometry and graphical statics, without the higher mathematics, which are pursued quite extensively during the four years' course. Prof. Clark does not altogether approve of the idea of having special courses, but the majority of students now prefer them so that it is doubtful if any decided change will be made at present.

It will be seen that the course comprises, practically, quite an extended university education in addition to the technical studies directly related to architecture. The school sessions begin in the morning at nine o'clock and last until about five, giving, on an average, seven hours a day devoted to recitations and drawing. Of the total time during the whole course, 285 hours are given to pure mathematics; 110 to applied mathematics; 420 to languages; 530 to miscellaneous studies, such as geology, history, physics, etc.; 321 to lectures upon the theory of architecture; 105 to construction; and the balance of 3269 hours to drawing and designing. In other words, general university studies occupy 1345 hours or 25 per cent; the theory of architecture 426 hours, or 10 per cent; drawing and designing 3269 hours, or 65 per cent of the time for the entire course. It should be said, however, in regard to this classification, that it is somewhat arbitrary and the ratio is obtained by assuming that whatever time is left from the general studies the student devotes to drawing. In the majority of cases this is probably a true assumption, still, as is hereafter explained, the student is not bound to any certain number of hours for drawing but to a certain amount of work, and many students will get through much quicker and easier than others.

The study of construction is included under the various heads of materials, working-drawings, iron-construction, etc. These topics are handled entirely by Prof. Clark in the shape of lectures. In addition to the lectures, the classes are taken out to inspect buildings in process of erection, although this exercise is purely voluntary, and the classes being so large it is difficult to get the utmost good from such opportunities. In the lecture on working-drawings Prof. Clark has to assist him a set of detailed and full-size drawings, which have been prepared for the purpose, illustrating the different forms of ordinary wood and masonry construction. The students are required to prepare one drawing a week illustrating definite and practical problems; and, in addition, there is one lecture a week on variations in local practice. Besides this, the class, as a whole, is required to prepare and draw out an entire set of framing plans for some rather extended building. The subject of piling, foundations, etc., is taken up in the form of lectures, with two or three hours a week devoted to architectural problems and calculations.

It will be seen that, with the single exception of mechanical drawing in the first year, there is no drawing, as such, taught in the architectural department. There is, however, considerable practice in drawing, which, of necessity, forms a part of the other studies. The drawing mentioned in the first term of the second year is taken in connection with the study of the orders. All of the students are required to have a copy of Vignola and the orders are drawn out using it as a reference, the size of the module being given by the professor. The students are required to prepare one or two plates every week, and are given a pretty thorough drill in the orders. The "elements of architecture" refer to the studies of proportions of building, generally involving also studies of the orders, and the drawings are made from copies. The study of shades, shadow, and perspective is also properly drawing, although only incidentally so, the theory and practice of perspective being considered purely with reference to architectural drawings. Sketching, noted during the second term of the second year, is optional with the student, and is designed to be entirely outdoor work. During the third and fourth year the student has considerable practice in sketching and water-color drawing. The classes are under the direction of Mr. Ross Turner, and are allowed two hours each week, this being supplemented by occasional sketching trips during pleasant weather. Another study, which implies considerable

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drawing, is classified in the catalogue as "lectures on fine art." This is merely a name to designate a number of different features introduced into the department from year to year. At present it consists of exercises in rendering in pen-and-ink. Each student is given a sheet of drawing-paper on which is printed, in very pale ink, an outline of some simple building, and one or two hours, according to the problem, is allowed for simply rendering the drawing. This exercise is under the direction of Mr. D. A. Gregg, It extends through the year.

Original designing is begun in the second term of the second year. The first problems are, necessarily, very simple in their nature, generally limited to portions of buildings, such as a porch, a portico, dormers, etc. The practice in designing is continued through all the rest of the course, the nature of the problems being graduated to suit the capabilities of the classes. The students' work is judged by various architects from Boston and vicinity, who are appointed by a regular committee of the Boston Society of Architects. In order to develop the individual possibilities of the student, the same system is used at the Institute that is in vogue at the School of Fine Arts in Paris. Every month three days are given to the preparation of a sketch in accordance with a programme which is posted up in the drawing-room. The students are allowed one month in which to develop the sketch into finished drawings, adherence to the original scheme being obligatory. The final drawings are required to be handed in very promptly. If the student is behind time he is allowed twenty-four hours in which to make up, but is only allowed half the credits he might have gained on that particular problem. A few of the actual problems may be of interest in this connection and will illustrate the style of work which the students are required to follow.

A Park Entrance. — "The principal entrance into a large park leads directly into the grounds from an avenue which runs along one side. The building over the entrance is not more than ten or fifteen feet deep, and consists of three equal arches ten feet wide in clear for carriages, with rooms on each side for keepers, police, etc. The space on each side of the archways is the same as the distance between centres of the arches, thus making five equal divisions of the building. The surface above the arches is treated with an attic and suitable figures, giving a good sky-line. On each side of the main building are entrances for people on foot, these entrances to be covered or not as chosen. All the entrances are to be closed with iron gates, and an iron fence or stone wall placed around the park. Design of gates must be shown. Required: sketch-plan and elevation $\frac{1}{16}$ inch scale. Finished design the same, $\frac{1}{8}$ inch scale."

This problem was for the second year. The following was for the third year:

A Gardener's Cottage. — "This little, one-story stone house, is supposed to be built by a gentleman, for his gardener, in the neighborhood of his garden. It will contain, below stairs, veranda on one side of the house, vestibule, stairs, two rooms, viz., sitting-room and kitchen, supplied with closets. The front door opens into the sitting-room, the back door into kitchen. Also an open shed for washing, with tool-room and water-closet. Up stairs are to be managed a chamber and two bed-rooms, these rooms to be located in the roof, lighted by large dormers. Required: 2 elevation $\frac{1}{8}$ inch scale, 2 plans $\frac{1}{16}$ inch scale."

In teaching the history of architecture, Fergusson is used as a text-book. The recitations are from about one-third of the chapters in the book and are supplemented by lectures and illustrations or lantern slides. The history of architecture is at present, taught by Mr. Homer. The study designated in the fourth year as "history of ornament," consists of lectures by Mr. C. Howard Walker, architect, of Boston. These occur twice a month, and are supplemented by plates drawn out and colored as directed for special problems every intervening week. During the last term of the fourth year considerable attention is paid to the subject of planning. There are lectures by Professor Clark, on the history of planning, and special study of house-planning with reference to domestic work, comparison with foreign examples, etc. At the same time, schools, theatres, churches and public buildings are considered separately and illustrated by the best available examples. The study of specifications is taken up in connection with Professor Clark's work on "*Building Superintendence.*" Heating and ventilation is taught quite thoroughly in theory, in the physical department of the Institute, and does not come under the actual charge of the teachers of architecture. It is illustrated by inspection of actual examples in the city theatres and school-houses. Stereotomy is also an outside study comprising drawing exercises from plates of definite problems.

The architectural department does not now make in the course any attempt at shop-work, except the tests of materials in the course in "applied mechanics." The Institute has unusual facilities for mechanical engineering practice, but none for just such work as Professor Clark would wish to make a part of the architectural course, except what is done on the testing-machine. Vacation work is not required of the students. The entire school year comprises thirty weeks. There is, consequently, a very long vacation in the summer, and students are encouraged to enter offices, whenever possible, and obtain practical acquaintance with architecture.

The architectural department occupies the greater portion of the second floor of the new building of the Institute, at the corner of Clarendon and Boylston streets. There is a large drawing-room with space for about seventy desks. There is also another drawing-room, fitted up with fourteen desks which are reserved for advanced students and those working for a degree. Opening directly from the main drawing-room is the department library comprising six hundred and fifty volumes, and some three thousand photographs bound in books. The library and photographs are entirely free to the students, who are encouraged to use the collections very freely. There is, also, quite a collection of casts and models of architectural fragments, and a very fine lot of French school drawings, including some of the *Envois de Rome*, which were secnred by Professor Ware, some years since, in Paris.

In addition to the special library, several thousand photographs, prints, drawings, and casts have been collected to form a nucleus for an architectural museum, by means of a special fund raised for the purpose. To these collections large additions have been made, mostly by gifts. Models and illustrations of architectural detail and materials are arranged in the rooms of the department, but the chief part of the collection of casts of architectural sculpture and detail belonging to the department has been, for want of space in the Institute buildings, deposited in the Museum of Fine Arts, together with the architectural collections belonging to the Museum. The students of the department have free access to them at all times; and as the Museum building is close at hand, no inconvenience results from the change.

To be admitted as a regular student in the first-year class, the applicant must have attained the age of seventeen years, and must pass a satisfactory examination in arithmetic, algebra, plane geometry, French, English grammar and composition, history and geography. To be admitted as a regular student in either the second, third or fourth years, the applicant for this advanced standing must have attained the proper age (eighteen, nineteen, and twenty years respectively), must in general pass satisfactorily the examination for admission to the first-year class, and examinations on all of the subjects given in the earlier years of the course which he desires to enter. Graduates of colleges are admitted to the Institute without examination, and will be permitted to enter any of the courses at such a point as their previous range of studies shall allow.

The number of regular students last year in the department of architecture was seventeen; the special students numbered forty-eight, making a total of sixty-five. This does not include the students in the preliminary year, who are not classified in any department. Of the regular students, three were from Boston, eleven from New England, one from the Eastern States, and two from the West. Of the specials, eleven were from Boston, twelve were from New England, eleven from the Eastern States, and fourteen from the West. As previously stated, the first graduation from the department was in 1873. The single student who obtained a degree at that time, is noted in the catalogue as having abandoned the study of architecture, and being employed on the Fitchburg Railroad. Since 1873 there have been twenty-two graduates in the regular course, an average of one and seven-fifteenths per year. Of these twenty-two graduates, eight have abandoned the profession entirely, seven are employed as draughtsmen in architects' offices, and the remaining seven are practising architects. Of the fourteen graduates from the regular course who remained in the profession of architecture, nine are resident in Boston, one more in New England, three in the Eastern States, and one in the West. These figures, of course, include only the regular students. It is impossible to get at any satisfactory idea of the number of specials, but as many of the special students pursue the course only in a tentative spirit, it is fair to assume that the total number who have left the school after having pursued the special course, is not over fifty or sixty.

The degree of Bachelor of Science is conferred upon the students in the regular course who pass satisfactory examinations in the prescribed studies and in addition presents a satisfactory original design accompanied by an explanatory memoir.

Every student is required, on entering the school, to file with the bursar a bond in the sum of two hundred dollars, signed by two responsible sureties, one of whom must be a citizen of the United States, as security for the payment of all bills of the Massachusetts Institute of Technology. If, for any reason, such a bond cannot be obtained, a deposit of fifty dollars, as security, will be accepted. No officer of instruction, or student of the Institute will be received as surety.

The tuition-fee for regular students is $200 per year, and must be paid in advance as follows: $125 on or before October 10, and $75 on or before February 10. For one-half or any less fraction of a school year, the fee is $125. Payment is also required of the cost of apparatus injured or destroyed in laboratories. Special students pay, in general, the full fee; but when a few branches only are pursued, and the time required for instruction is limited, some deduction may be made. The fee for students in the advanced courses is the same as for regular students. The total cost for attendance at the Institute during four years is, therefore, as follows, exclusive of expenses during vacation, and all personal expenses: —

Tuition.	$800
Books and material.	190
Board and Room at $8 per week.	960
Total.	$1900

It would be difficult to accomplish the course at less cost than this, and we fancy the majority of students spend much more.

The Boston Society of Architects has founded two prizes of $50

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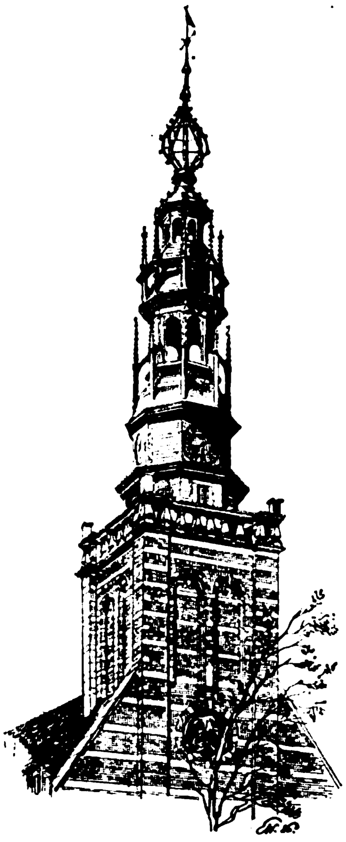
each, to be given in books to the student who, during the year, shows the greatest improvement in design, and also to the one who makes the most marked progress in construction. There are scholarships open to regular students in the Institute, but they are mostly for students who have entered the Institute under certain conditions, and the architectural department seldom profits by them. By the bequest of the late Richard Perkins, the income of $50,000 is to be applied to the creating of additional scholarships, all of which will be open to students of the department.

ON ARCHITECTURAL MATTERS IN SWEDEN.



Tower at Leyden. From Architektonische Rundschau.

WHEN a country is developing under generally good conditions of social ease and good political terms with its neighbors there is every prospect of progress in art generally and in the art of architecture especially. This is at present the case with Sweden. This country, however, is by its remote situation and its small size generally only little known to the outside world. It is off the ordinary route of commerce and far from the political centre of Europe, but yet is a country that has for seventy years been at perfect political ease and consequently has had time to develop all its natural forces and pay all possible attention to domestic matters, to industry, agriculture and building. It is more and more visited by strangers, which shows that the attention it attracts from the outside world is increasing and that people want not only to know the country by hearsay, but to see it and make their own investigations. As proof of progress it may be mentioned that it has, during the last decade, enlarged and beautified its cities to a good extent, especially its capital, where a great building boom has prevailed these several years.

Sweden has not always been of its present size. There was a time when it deserved a place at the side of the great powers. It had defeated Germany and other powers after many and long-lasting wars, and from the beginning of the seventeenth to the beginning of the eighteenth century it held possessions all around the Baltic Sea from some northern parts of Prussia up to and including Finland. During that century immense wealth was brought into the country, which led to an amount of building that surpassed that of any other time in the history of the country. Strongholds, castles and churches were erected in a most solid way, and many fine examples of architecture of this past time worthy of attention are still left. There is a little island in the Baltic Sea called Gotland, which, singularly enough, was at that time quite inundated with new buildings of all kinds. The cause of this was its abundance of the best of building materials, its splendid southerly climate, which is rather different from that of the continent, and its location, as all the merchandise from the East had to pass this way over to the Continent, and so kept up business and made the small place progressive. The architecture of the place, although showing German influence, acquired a character of its own, and consequently this is the only part of the country that has in any marked degree been the object of special studies by foreign experts, especially Englishmen.

When viewing any large city, we must always bear in mind that the general look of the whole is not only dependent on the plans and designs delivered by the architects, but in a most remarkable degree on the building-law and on the laying-out of the streets. The architect has often a hard task in trying to make "something nice" when squeezed within a very limited space by more or less ingenious prescriptions of a building-law. It is true that a city building must generally be of a character different from that of a country house. It gets a character of calmness, earnestness and regularity, while the country house, the big castle or the small cottage, which do not know any laws of erection, necessarily create a lively and somewhat attractive impression merely by their well-detached masses, even if the architecture be defective.

Sweden has one building-law common to all cities and towns, giving rules of general character, besides an especial law for each on account of differing wants, while the capital has one still more specific and detailed. The present building-laws of Sweden, though, leave much to desire and are likely to be submitted in the near future to some changes to better meet the demands of the present time. For instance, the height of all buildings is very limited, always depending on the width of the street, but never exceeds five stories. Still, allowance can be made for important private or public buildings which are to be built free on all sides.

The interests of sanitation are generally well provided for. For instance, large yards are prescribed and building is not allowed on more than two-thirds of the whole site, the surface of the yard must not be less than 1900 square feet, and the main part of the same not less than forty feet in width. Light-shafts are not allowed of any shape or size whatever in the new part of the city, but can, under certain circumstances, be allowed in some of the old parts. Concerning the roof and its construction many limitations are made by the law. The pitch of the roof is not allowed to be more than two-fifths of the width of the part of the building it covers, and the mansard roof is not allowed on dwelling houses. All drawings must be filed in the Building Department and in the Health Department, and all building is supervised by inspectors from these departments.

In Stockholm the building-lots are generally very expensive, and that causes the owners always to erect their buildings as high as the law allows. Consequently, the cornices of all buildings form almost one continuous line, which is almost as bad looking as the too great differences in height of buildings to be seen in New York and other cities of this country. An owner of a building or a tenant never occupies the whole house for himself, but merely one story, consisting of six to twelve rooms according to different circumstances.

The tenement-houses are generally well arranged, at least those erected during the last decade, and give in many cases real comfort to the lower class of people, who have been benefited greatly by the recent progress in building. There are several kitchens on each floor, with two or three rooms belonging to each.

The shapes of building-lots are varied, of course, but in new parts of the city tend to squareness. There are never to be seen lots so narrow at the front as often in cities here, which afford space for only three windows, which seem almost to be the regular width of the American city dwelling-houses.

The buildings are generally erected in a careful and solid way with especial regard to keeping the houses warm and comfortable during the cold season. Still, during the winter time it is very seldom, if ever, so cold as it is here. The windows are well planned to keep the cold out. So-called French windows are always used, with a post in the middle, and the both halves opening outwards. In winter time two sets of window-sashes are used, put about three inches apart, the window-frames being so constructed as to make it easy to fix a loose set of sashes to the inner side of the frame. It was very much the fashion some time ago to have all the rooms in one line in order to give a nice perspective view of the rooms from one end to the other, but now this idea has been more and more abandoned, and the fashion is to have the rooms centred around the hall, from which it is desirable to have entrance to as many rooms as possible.

A special feature of each room is the brick stove, which has nearly the same height as the room itself. They are built up of bricks of a certain size and of plain or moulded pieces of burnt clay of a special kind, which are polished and glazed on the surface, and also of many different colors. The design of the whole is sometimes treated very decoratively, and therefore these stoves are often found very costly, but are also truly considered as a real ornament in the room.

To reach the upper stories, one has always to use the stairs, as elevators are with few exceptions not used, but instead the stairs are constructed with a considerable width, and much attention is generally paid to the arrangement of the hall and staircase together to give it plenty of light and air.

Nature favors builders with an abundant supply of the best of building stones, good clay for artificial stone and terra-cotta, while the large forests furnish the best kinds of timber, of any desirable size. Granite is exclusively used for foundations and main doorways, and also, although seldom, as face-stone. Limestone and sandstone are more used as facing for buildings, as mouldings, ornaments, and window-frames. The Island of Gotland is almost entirely one big rock of sand and lime stone.

The country does not supply the whole amount of face-brick, wanted for building. A good deal is imported from Germany. And terra-cotta is only sparingly used strange to say — strange, because there is an abundance of good clay over the whole country but the activity in raising that industry has as yet been very slow.

More used in building is cement, the making and moulding of which has been greatly improved during the last years. Not only for mouldings and ornaments, but for floors, window-frames, steps and stairways, made in whole blocks, it is in common use and is very often ornamented in color and polished, which gives a smooth and nice-looking surface.

The cost of common brick is eight dollars and upwards per thousand, and of first-class face-brick, twenty-five to thirty dollars. The average contractor usually counts for common good brickwork, laid in lime-mortar, twenty cents per cubic foot. The workingman gets paid both by time or by contract, the former way always when there is to be taken especial care in the erection of a building. A good bricklayer then earns about $1.75 a day. In making contract he usually gets from $4.00 to $7.00 for the work of putting 1000 brick into the wall.

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The architectural training in Sweden is on a good standing. Most of the architects are thoroughly trained, not only having spent many years of study at the schools and university of architecture at home but abroad in Italy, France or Germany, and are generally well-prepared for their practice before starting. At the schools more stress is generally laid on teaching of matters of styles and the æsthetical part of architecture than to matters of construction.

The charges of the architect are generally different for different kinds of work, but on an average three per cent of the cost of building.

In speaking of architectural matters we ought to mention the king's palace at Stockholm, although begun in the last century, and completed in the beginning of this century. It was built by Tessin, undoubtedly one of the most prominent artists of his age, even compared with those of other countries. The vast structure makes a rich and grand impression, and is considered one of the most beautiful in the world, by its situation with plenty of surrounding water, its majestic extent, and by the harmony of all its different parts.

During this decade building has been carried out on a great scale in all the larger cities, and especially in Stockholm, and in all buildings have generally been used all improvements of our time in order to make structures solid and life comfortable, while the elevations show good and carefully-studied work. Martin Borgstedt.

The Illustrations

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

HOUSE OF E. V. R. THAYER, ESQ., LANCASTER, MASS. MESSRS. ANDREWS & JAQUES, ARCHITECTS, BOSTON, MASS.

[Gelatine Print, issued only with the Imperial Edition.]

LADIES' HALL, LAWRENCE UNIVERSITY, APPLETON, WIS. MR. WARREN H. HAYES, ARCHITECT, MINNEAPOLIS, MINN.

This building is to cost $25,000.

ENTRANCE TO BISHOP'S PALACE, SENS, FRANCE. — DETAILS OF CEILINGS AT BOURGES AND EVREUX, FRANCE. DRAWN BY MR. J. A. SCHWEINFURTH, ARCHITECT, BOSTON, MASS.

These illustrations are reproduced from "*Sketches Abroad.*"

MAIN HALL, IN "ROCKWOOD HALL," TARRYTOWN-ON-HUDSON, FOR W. ROCKEFELLER, ESQ., N. Y. MESSRS. CARRERE & HASTINGS, ARCHITECTS, NEW YORK, N. Y.

Hall in quartered oak, marble mosaic floor, modelled ceiling and marble stairs. This work in a slightly modified form is now being built.

THE ROYAL LIBRARY. — THE OLD HOUSE OF LORDS. — THE NATIONAL MUSEUM AND ST. CATHERINES CHURCH, STOCKHOLM, SWEDEN.

HOUSE BUILT IN CONNECTICUT, IN 1880. MR. C. E. CASSELL, ARCHITECT, BALTIMORE, MD.

SOME OBSERVATIONS ON THE HYGROMETRIC BEHAVIOR OF CERTAIN WOODS.

These experiments consisted of observing the changes in weights of a number of samples of kiln-dried woods which took place upon their exposure to comparatively slight changes in atmospheric conditions.

The following kinds of woods were used:

WOOD.	Dimension.	Weight.	Specific gravity.
	Inches.	Grammes.	
Whitewood	1.97 × .76 × 1.58	19.5395	.5072
Liriodendron tulipifera			
White pine	1.47 × .86 × 1.67	17.4786	.5052
Black walnut	1 48 × .90 × 2.00	28.3955	.6504
Cherry	1.50 × 1.00 × 2.00	26.1479	.5318

Several weeks prior to weighing the samples were kept in a dry, well-ventilated building.

The air of the room in which the samples had been kept was evidently somewhat dryer than in the balance-room, which is shown by the cherry sample immediately gaining in weight as soon as placed upon the balances. The other samples were not examined in so great detail, although the same behavior was shown by each after a greater interval of time had elapsed.

DETAILS OF THE WEIGHINGS.

WHITEWOOD.

No.	Interval of time. H.	M.	Successive gain.	Total gain.	REMARKS.
	H.	M.	Grammes.	Grammes.	
1	..	..	..	..	
2	2	22	.0105	.0105	
3	1	37	.0052	.0157	
4	3	8	—.0072	.0085	
5	16	32	.0596	.0681	After resting over night.
6	3	48	.0092	.0773	
7	23	58	.1708	.2481	After remaining one day on ground floor of building.
8	4	5	8.4924	8.7405	Submerged in boiling water twenty minutes.

WHITE PINE.

No.	Interval of time. H.	M.	Successive gain.	Total gain.	REMARKS.
	H.	M.	Grammes.	Grammes.	
1	..	..	..	..	
2	1	27	.0110	.0110	
3	1	42	.0076	.0186	
4	3	7	—.0078	.0108	
5	16	34	.0766	.0874	After resting over night.
6	3	40	.0033	.0907	
7	24	..	.1673	.2580	After remaining one day on ground floor of building.
8	4	1	15.4034	15.6614	Submerged in boiling water twenty minutes.

BLACK WALNUT.

No.	Interval of time. H.	M.	Successive gain.	Total gain.	REMARKS.
	H.	M.	Grammes.	Grammes.	
1	..	..	..	..	
2	2	25	.0087	.0087	
3	1	42	.0048	.0135	
4	3	9	—.0066	.0069	
5	16	30	.0586	.0655	After resting over night.
6	3	46	.0090	.0745	
7	23	58	.1706	.2451	After remaining one day on ground floor of building.
8	4	6	4.7194	4.9645	Submerged in boiling water twenty minutes.

CHERRY.

No.	Interval of time. H.	M.	Successive gain.	Total gain.	REMARKS.
	H.	M.	Grammes.	Grammes.	
1	..	..	..	..	
2	..	5	.0029	.0029	
3	..	5	.0018	.0047	
4	..	5	.0020	.0067	
5	1	20	.0214	.0281	
6	2	55	.0215	.0496	
7	1	..	.0351	.0847	One hour on ground floor of building.
8	..	20	—.0026	.0821	In balance-room.
9	..	30	—.1450	—.0629	Exposed to air outside the building in direct rays of sun.
10	1	10	.0495	—.0134	In balance-room.
11	..	7	.0080	—.0054	On ground floor.
12	..	8	.0020	—.0034	In balance-room, exposed to sun's rays, window closed.
13	13	35	—.0590	—.0624	After resting over night in building where originally kept.
14	..	32	.0110	—.0514	In balance-room.
15	1	43	.0198	—.0316	
16	3	8	.0005	—.0311	
17	16	30	.0964	.0653	After resting over night.
18	3	40	.0084	.0737	
19	23	59	.1910	.2647	After remaining one day on ground floor of building.
20	4	5	33.5974	33.8621	Submerged in boiling water twenty minutes.

In the first table the dimensions are given in the order of width, thickness and length for each sample: their weights as first taken and specific gravities computed therefrom.

In the tabulations of the details of the weighings are given the intervals of time between each weighing and the gain or loss in weight. Losses are indicated by minus signs, and in the column of remarks, what treatment the samples had been subjected to. It will be understood that the samples remained in the balance-room after weighing began, unless stated otherwise.

The treatment of the cherry wood was, after the fourteenth weighing, substantially the same as of the others after the second weighing.

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During the interval between the last two weighings, the samples were submerged in boiling-water where they were kept twenty minutes, the water was then cooled to about eighty degrees Fahrenheit, the samples removed and immediately weighed.

The first three samples behaved very much alike in the early weighings, also the cherry for corresponding weighings, but the several woods differed in the degree to which they were affected.

The whitewood, white pine and black walnut at first gained in weight then lost slightly, gained over night and during the following day. The loss occurred in the afternoon. Taken to the ground-floor of the same building and there kept one day, and there was a greater increase than before.

Up to this time the actual gain was about the same in each sample, although in per cent the walnut had gained the least, on account of its higher specific gravity.

After submersion a radical difference was found, the walnut gained the least, the whitewood had gained nearly twice as much as the walnut, and the pine gained nearly twice as much as the whitewood.

This was explained when the samples were split longitudinally, the water had penetrated the walnut endwise to a depth of only .15″, the whitewood to a depth of .22″, and the pine to a depth of .45″.

The cherry sample was weighed at frequent intervals when first placed on the balances. It gained rapidly in weight, but at a diminishing rate as it approached the limit of saturation in that atmosphere, but when, however, it was removed to the ground-floor of the building, a somewhat damper atmosphere prevailing, it again gained rapidly. Returned to the balance-room and there was loss in weight. Exposed to the sun's rays and a dry brisk wind and there was a large loss exceeding the total gain thus far observed. A few changes in location were then made, each producing results in accordance with previous experience. So sensitive was this wood to change in weight that it would seem quite possible to accurately tell where the sample had been taken to if removed from the balance-room to other parts of the building, or to the outside air and returned again to the balance-room. In some buildings the difference in the relative dampness of the several floors might be shown.

After the twelfth weighing the cherry sample was taken to the building in which originally kept, and there remained over night, during which time there was a loss of 590 mg.

Notwithstanding there was a shower of rain in the meantime, the relative humidity of the atmosphere ranged from 52 to 64 per cent, the thermometer indicating from 70 to 84 degrees Fahrenheit during the days these experiments were in progress.

After submersion this sample was found to have gained the total of 33.8621 grammes, or more than its original weight. It is seen that the present weight exceeds an equal volume of water.

When split longitudinally every part of the wood seemed to have been wet, the penetration or moisture was apparently complete.

The description of these tests have been given somewhat minutely, in order to clearly indicate what changes go on in a brief space of time, and without large changes of atmospheric conditions. Were the observations extended over a longer period, or from season to season, greater differences in weights would be expected.

The amount of moisture absorbed under ordinary circumstances seems to depend upon the amount of surface accessible to the air, of which surface the outside parts of the sample form only a limited portion.

A specimen might have low specific gravity, and actually contain only a small amount of woody fibre, yet its structure be such as to prevent the free circulation of air through it, and, therefore, not expose much surface on which condensation may take place.

In the tests, we see the cherry-wood, low in specific gravity, it is true for its kind of wood, absorbing moisture at a more rapid rate than the softer whitewood and pine samples, and further the denser walnut bearing a very close resemblance to the whitewood up to the time of submersion in boiling-water.

Not enough is shown at this time to say whether the woods bear the same relation to each other in regard to imparting their moisture as in absorbing the same.

Closely allied to the subject of the absortion of moisture is the subject of expansion and contraction, or, as generally spoken of, the shrinking and swelling of wood.

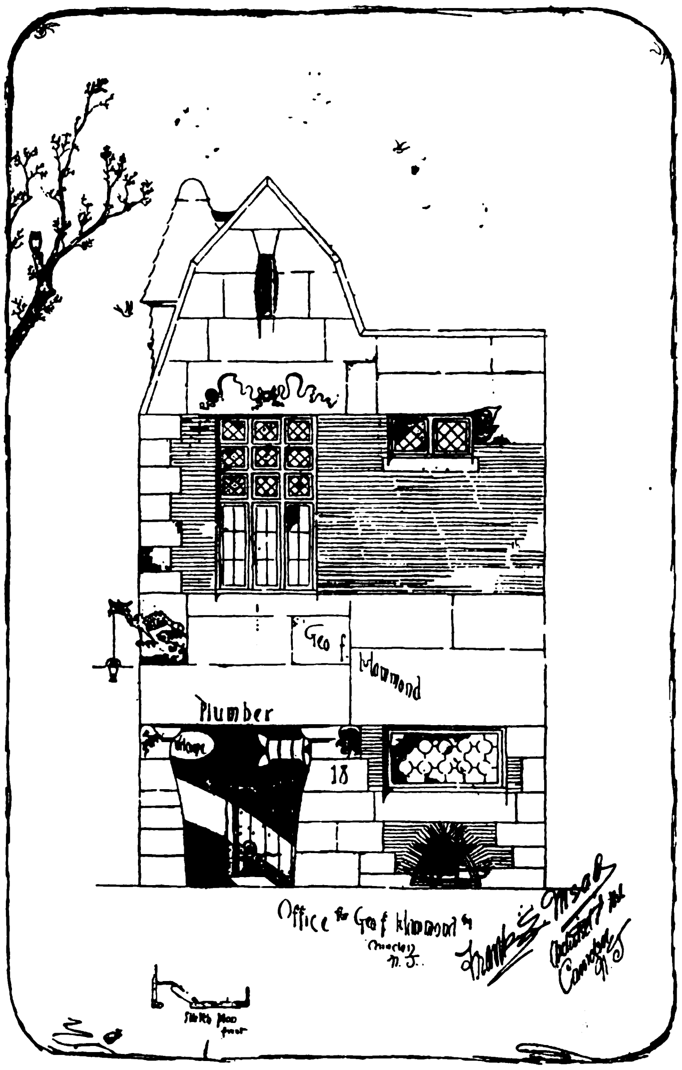
It may be inferred that the amount of moisture absorbed will not always be correctly indicated by the swelling of the wood.

The impression seems to hold among woodworkers that cherry retains its shape rather better than whitewood, or in the reverse order of their rates of absorption here shown.

The relative expansion of wood and its elasticity in a transverse direction is an important question.

Where it is essential to maintain close joints, such information would enable us to say whether it were possible or not to secure this end with certain kinds of wood, and if it were possible then to ascertain what lateral compression would be necessary to hold the wood in place. Obviously the range in elastic movement under lateral compressive stresses must be greater than the range in movement due to shrinking and swelling, to make it possible to keep the joints together at all times. J. E. HOWARD.

THE SUBWAY PROBLEM IN GREAT BRITAIN.



IN all that follows it is well to remember that all wires except the telephone are "in a circuit." One wire will operate a great many telegraph instruments, electric-lights, "tickers," or messenger-calls, but, practically, every one of the 700 telephones in use in New York city has its separate wire. In New York we have doubtless 30,000 miles of wire, of which eighty per cent are telephone conductors. In London, with four times our population, there are not over 19,000 miles of wire, of which 11,000 miles are telegraph wires and 7,000, or thirty-seven per cent, telephone. Of the former but 868 miles are above the ground. Of the 7,000 miles of telephone wires in London all are overhead, excepting those operated as private lines by the Post-Office Department, which are underground in the same conduits as the telegraph. In the whole of the United Kingdom there were last year about 27,000 miles of telegraph wire, of which about 20,000 miles, seventy-four per cent, are underground. Comparing New York with London, the first striking difference we notice is in the relative proportion of telephone to telegraph wires. This must be remembered, for it constitutes the chief difference in the underground problem as between the two cities. The telephone in England, comparatively speaking, is still a luxury, electric messenger-service is practically unknown, and electric street-lighting in embryo.

On the Continent the Government has, as a rule, been more liberal to the telephone interests. Comparing Stockholm and Edinburgh, for instance, each with about the same number of inhabitants, we find that while in the former there are over 5,000 subscribers to the *Telephone Exchange*, in the latter there are about 400. On January 1, 1886, there were about 353,518 telephone receivers and transmitters in use in the United States under license from the Bell Company. In Great Britain there were on the same date 184 exchanges with 19,784 subscribers. As has already been intimated, little has been done in London towards the burying of any wires except those of the telegraph proper.

It will be interesting to compare the relative demands of telegraph service in the two cities. The Associated Press despatches from New York are said to *average* daily over Western Union wires alone 2,600,000 words. The *maximum* newspaper work reported by the Government telegraph authorities in London was, on the day of Gladstone's great speech on home rule, April 18, 1886, 1,050,000 words. The day the Emperor William died, by the way, there were sent off from the Berlin telegraph office 29,878 messages, aggregating

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799,926 words. On the following day this record was beaten with 36,615 messages, aggregating 1,115,551 words.

In addition to the electric telegraph, there are in London thirty-two miles of pneumatic-service tubes, the longest being between the House of Commons and the Post-Office (3,859 yards), carrying 700 messages daily at a speed of six minutes, similar to those of the Western Union here.

While the telegraph wires of London are so largely underground, there are some who attribute the slow growth of arc-lighting in England to the act of Parliament requiring the electric-light wires to be buried. The difficulty presented in the transmission of electrical vibrations over a wire, whether above or below the earth's surface, varies, of course, with the strength and character of the current employed. In the arc-light current, at one extreme, we have an intensity capable of producing instant death like the lightning stroke, of fusing metals, and instantly setting fire to any combustible matter. At the other extreme stands the telephone. It has been demonstrated "that the strength of the electrical current produced by an ordinary telephone in use as a transmitter is less than that which would be generated by a single battery-cell through a line of ordinary telegraph wire 6,000,000 miles in length, and the strongest current produced by such a telephone is only four hundred-thousandths as strong as that used on a telegraph line, while a current one-millionth as strong as the ordinary telegraph current will give distinct, audible articulation."

Two facts are apparent from our brief comparison:

(1) Successful underground electrical service is to-day in London chiefly a question of telegraphy, while in New York it is chiefly one of successful telephony.

(2) The methods and experience of London, whatever we shall find them to be, cannot be taken as an infallible guide for our New York conditions.

In spite of the unquestioned attendant drawbacks, I shall take it for granted that no one here still honestly persists in believing that successful underground service is *impossible* even for the telephone, while we need not go so far as Preece, the chief Government electrician in England, who recently said in public: "The Postmaster-General has now under his consideration a scheme for using underground wires more extensively," and added: "There is nothing whatever to prevent this being done by the telephone companies. In fact, in many cases telephones work better underground than overhead. The laws that govern the transmission of speech are now thoroughly known and the fancied difficulties in using the underground wires have vanished into thin air. In London alone we have 255 miles of pipes, containing 10,112 miles of wire. In fact, all our great trunk-lines are out of danger from stoppage from storms. There are 213 offices now served wholly by buried wires; we are steadily pursuing the same policy, and the overhead proportion as compared with the underground steadily diminishes."

In London and in Edinburgh, as in Brussels, Antwerp and other large Continental cities, the telephone wires are overhead, not, to be sure, in the streets, but, nevertheless, in the air; they are upon the house-tops. The telephone companies obtain permission from the owners of buildings to erect wooden or iron supports upon the roofs, and some of these carry over two hundred and fifty wires each. While this network of wires is visible from the streets when they cross over from block to block, they are neither in the way of firemen, nor in front of the windows of houses, nor are poles erected before one's door. Next to a subterranean system, this is by far the most satisfactory method of stringing wires, to the public at least. Then, too, in European cities, small copper or bronze wires are used instead of the larger iron conductors. In Paris the problem solved itself, for the electricians found the great system of sewers ready for them, and all the wires are strung upon their arches or sides, as accessible almost as if in the streets and requiring no "conduit" or other special structure; but where the sewer ends they come up out of the ground and continue on the house-tops.

Now, examining the London system, let us answer the practical American question, "How does it work?"

From the point of view of the practical electrician, the best and certainly the cheapest insulation in the world is dry air, and ideal electric service is sometimes most nearly attained on a clear winter's day with a naked, overhead copper wire. Compared with an overhead system even in the moist climate of England, Mr. Preece tells me that he considers the present iron-pipe, underground system sixteen times less efficient, *commercially*, or, as he put it, "Its cost is four times as great and its capacity one-fourth." Or, to put this in working figures: Between London and Edinburgh the distance is 390 miles. Between the two central telegraph offices thirteen miles of this distance are underground, while the remaining 377 miles are overhead. Between the points where the service is entirely overhead, they are able to send, by a rapid "multiplex" system, 600 words per minute, while from the actual termini, through thirteen miles of iron-pipe, only 150 words can be sent. Between London and Liverpool, 200 miles, Delany's multiplex works six ways from the overhead terminus, while from the central offices, partly underground, it works only four ways, that is, all overhead, 450 words per minute; partly through iron-pipes, 100 words per minute. This great loss in efficiency, be it remembered, is considered in connection with the telegraph conductors only. Under similar conditions it is but fair to suppose that long-distance telephonic communication at least would be almost impossible.

Mr. Preece frankly stated this objection to the iron-pipe system, and said that he "would welcome any change that offered possible improvement." The chief thing in favor of iron was "the protection against mechanical injury to the wire by laborers and its comparative cheapness." "Increasing the size of the conductor was of benefit, and some experiments with a large wire heavily insulated with Callender's 'bitite' and laid in asphalt, have given tests that were interesting and promised well when more fully tested by the Government."

The experience of London is that of nearly all the English cities: telephone and electric-light wires overhead, telegraph principally underground. Newcastle, however, is an exception. Here, at the very outset, the telephone company put all its wires below ground in the inevitable iron-pipe. There is but one central office, from which the wires radiate to the 700 or 800 subscribers, who are within three-quarters of a mile of the exchange. No. 16 and 18 copper-wires are used, quite heavily insulated and bunched in cables. The service is fair and there is small complaint. Other large cities are said to be on the point of burying telephone wires and have already put nearly all their telegraph wires underground.

However, the whole situation to-day in Europe, including Great Britain, may be summed up as follows:

Telephone service, overhead, small copper wires on neat standards upon house-tops, owners compensated for use of roof. Poles only allowed where roof service is impossible.

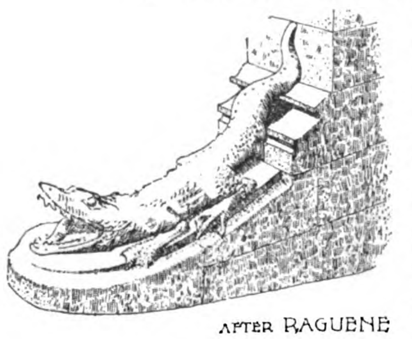
Telegraph service, largely underground in England and on house-tops elsewhere.

Electric (arc) light service practically all overhead.

And in conclusion it may be said that so complex and intricate a tangle as the subway problem in New York is not even dreamed of in Europe, much less solved. With our growing electric-light service, our district-messenger calls, and, above all, our great telephone system, with our network of gas and water and steam pipes in the the street, we have a problem that we must work out practically alone, unaided by European experiences. Radiating from our metropolis like the threads of a gigantic spider's web, including and connecting neighboring cities and growing towns and even distant cities, already there stretches a network of wires, along which throb the impulses of our commercial life. We think the problem of their location difficult to-day. What will it be when every man has a telephone in his house; when gas-light within, as well as without, gives way to the electric-light; when our streets must yield yet more room for fuel-gas pipes, larger water-mains, etc., etc., what shall then be done?

It needs but a brief glance ahead to see that our few iron-pipes or any other electric conduits must prove inadequate, and it requires no inspired prophet to predict that we must soon in New York come to the Paris system of sewers, cost what it may, at least on all main streets and avenues, wherein all our pipes and wires can be placed, and digging up the pavements cease.—*Albert R. Ledoux, in the N. Y. Evening Post.*

STONE FOOTING-COURSES.



AFTER RAGUENE

In arranging the footing-courses of walls and piers, it is frequently desirable to contract the area of the foundation as rapidly as possible. The method of doing this by the use of railroad-rails and steel I-beams has been presented recently in these columns. Although steel possesses superior advantages for this purpose, yet stone will continue, for obvious reasons, to be largely used for foundations, and hence it is desirable to know by what amount each footing-course may be narrower than the one next below it.

The amount of this off-set will be limited by the transverse strength of the stone. The part of the footing which projects beyond the course next above it resists as a beam fixed at one end and loaded uniformly. The load is the pressure on the earth or the course next below. The strength of such a course depends upon the amount of the pressure, the transverse strength of the material, the length of the projection, and the thickness of the course.

To deduce a formula for the relation between these quantities, let P = the pressure in tons per square foot at the bottom of the footing-course under consideration; R = the modulus of rupture of the material in pounds per square inch; p = the greatest possible projection of the footing-course in inches; t = the thickness of the footing-course in inches. From the principles of the resistance of material, we know that the upward pressure of the earth against the portion of the footing-course that projects beyond the course next above it *multiplied by* one-half of this projection *is equal to* the continued product of one-sixth of the modulus of rupture of the material, the breadth of the footing-course, and the square of the

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thickness. Expressing this relation in the above nomenclature and reducing gives the formula:

$$p = t\sqrt{\frac{R}{41.6P}};$$

or, with sufficient accuracy,

$$p = \tfrac{1}{6}\,t\sqrt{\frac{R}{P}}.$$

The projection available with any given thickness, or the thickness required for any given projection, may easily be computed by the above relation. Notice that the off-set given by the above formula is the projection for which the stone would be on the point of breaking and not that which may be safely used.

The margin to be allowed for safety will depend upon the care used in computing the loads, in selecting the materials, and in bedding and placing the footing-courses. If *all* the loads have been allowed for at their probable maximum values, and if the material is to be reasonably uniform in quality and to be laid with care, then a comparatively small factor-of-safety is sufficient, but if all the loads have not been carefully computed, and if the job is to be done by an unknown contractor, and neither the material nor the work is to be carefully inspected, then a large margin is necessary. As a general rule, it is better to assume for each particular case a factor-of-safety in accordance with the attendant conditions than to blindly use the results deduced by the application of some arbitrarily assumed factor. The following table is given for the convenience of those who may wish to use 10 as a factor-of-safety.

SAFE OFF-SET FOR MASONRY FOOTING-COURSES, IN TERMS OF THE THICKNESS, USING A FACTOR-OF-SAFETY OF TEN.

KIND OF STONE.	R in lbs. per sq. in.	Off-set for a pressure in tons per sq. ft. on the bottom of the course.		
		0.5	1.0	2.0
Blue-stone flagging	2,700	3.8	2.7	1.9
Granite	1,800	3.1	2 2	1.5
Limestone	1,500	2.9	2.0	1.4
Sandstone	1,200	2.5	1.8	1.2
Slate	5,400	5.5	3.8	2.7
Best hard brick	1,300	2.7	1.9	1.0
Hard brick	800	1.0	.7	.5
Concrete {1 part Portland cement, 2 " sand, 3 " pebbles,} 10 days old,	150	.9	.6	.4
" {1 " Ros'dale cement, 2 " sand, 3 " pebbles,} " "	80	.7	.5	.3

To illustrate the method of using the above table: assumed that it is desired to determine the off-set for a limestone footing-course, when the pressure on the bed of the foundation is one ton per square foot, using 10 as a factor-of-safety. In the table, opposite limestone in the next to the last column, we find the quantity 2.0. This shows that, under the conditions stated, the off-set may be 2.0 times the thickness of the course.

If it is desired to use any other factor-of-safety, it is only necessary to substitute for R in the preceding formula the desired fractional part of that quantity as given in the second column of the above table. For example, assume that it is necessary to use limestone in the foundation and that it is required to contract the footing-courses as rapidly as possible. Assume, also, that the pressure, P, on the base of the foundation is two tons per square foot. If the limestone is of the best and if it is laid with great care, it will be sufficient to use 4 as a factor-of-safety. Under these conditions the formula becomes

$$p = \tfrac{1}{6}\sqrt{\frac{\tfrac{1}{4}R}{P}} = \tfrac{1}{6}\,t\sqrt{\frac{\tfrac{1}{4}\times 1500}{2}} = 2.3t.$$

That is, the projection may be 2.3 times the thickness of the course.

The above method is strictly true only when the footing is solid stone. To realize these results it is necessary that no stone should project more than half its length, and also that each stone should be well bedded. The results in the table agree very well with the practice of the principal architects and engineers for hammer-dressed stones laid in good cement mortar.

The preceding results will be applicable to built footing-courses only when the pressure above the course is less than the safe strength of the mortar. The proper projection for rubble masonry lies somewhere between the values given for stone and those given for concrete. If the rubble consists of large stones, well bedded in good, strong mortar, then the values for this class of masonry will be but little less than those given for stone. If the rubble consists of small irregular stones laid with Portland or Rosendale cement mortar, then the projection should not much exceed that given for concrete. If the rubble is laid in lime mortar, the footing-course should not project more than half that allowed when cement mortar is used.

Notice that drawing in the footing-courses decreases the area under pressure and consequently increases the pressure per unit of area; hence, the successive projections should decrease from the bottom upwards.

IRA O. BAKER.

BOOKS AND PAPERS.

IT is no small undertaking to offer to a captious and exacting profession a collection of sketches of European architecture. Possibly the standards of criticism have advanced more rapidly than the art growth which the criticisms are supposed to gauge. At any rate, much more is expected now than was demanded ten or fifteen years ago, and the draughtsman who would seek approval from the profession must excel not only the work of a corresponding nature produced in this country, but must measure his strength with the work of his English cousins and his French confrères, for American art of to-day is nothing if not cosmopolitan. It is, then, with a considerable degree of satisfaction that we examine the recently-published volume of foreign sketches by Mr. J. A. Schweinfurth,[1] a work which, while not claiming to be more than a fragmentary record of a trans-Atlantic trip, is of too earnest a nature to be classed with some of the sketch-books which our *dilettanti* have offered to the public in past years. It is a production which is neither a "pot-boiler" nor a "grindstone," to use studio slang; a work which is valuable, both for its documents and its draughtsmanship; the outcome of careful observation by an architect whose experience had been the best the country could afford in the lines of preparation, who went to Europe with distinct ideas of what to study and how to find it, and who thought a great deal more than he drew. One strongly-pointed moral is brought out by the volume before us — the necessity, the inestimable advantage of a thorough training in this country before studying the architecture of Europe. The author presents us a portion only of the work of nine months; we fancy very few of our students abroad could make as good a showing for the whole of an entire year's work.

A commendable feature of the work is the absence of any encumbering literary effort. There is simply nothing but drawings. There is an index to be sure on one leaf of the cover, but as the plates are not numbered, it does not refer to anything. The drawings speak louder than words, and they speak in the way architects will enjoy. Mr. Schweinfurth tells the story fully, not contenting himself with merely indicating, but working out in detail to an extent which would cause a less conscientious draughtsman to shrink from the mere labor involved. In the drawing of the gateway of the Bishop's Palace at Sens, for instance, the mass of foliated detail, the pose and action of the semi-grotesque figures on each side, even the strong jointings of the stonework, are all fully elaborated without detracting from the harmony of the *ensemble*. The measured drawings of ceilings at Bourges and Evreux, while in the truest sense artistic, exhibit a documental accuracy which betrays the feeling of the architect, who measured them with a view to using the designs himself some day.

The author seems to have a special fondness for the old French manoirs and châteaux, and has sketched a number which are seldom seen in architectural publications. Indeed, it may be said of nearly all the subjects that they are novel, out of the beaten track, striking one at first sight as new discoveries, fresh additions to the architectural baggage of the profession; and although it is extremely doubtful if nowadays there is anything remaining in France or Italy which has not been thoroughly published a score of times, still many of these sketches are reminders of the delightful, half-forgotten by-ways of artistic travel; of the bits of quaint delicacy which lie hidden in so many of the little sleepy provincial towns, and offer such rich rewards to the patient enthusiast who fears neither the racking torture of the Italian diligence nor the digestive horrors of provincial French cookery.

The drawings are reproduced by the heliotype process and as samples of printing are very clean and sharp. They are not fac-similes, in that they are reduced considerably from the originals, a fact which is rather an advantage for the reproductions; but they show how freely Mr. Schweinfurth works with pen and pencil, to be able to make drawings so large and yet preserve such a fresh, breezy appearance, and so luminous a touch. The sheets measure 15 x 20 inches and very little of this space is wasted in wide borders. The plates are not bound but are laid loose in a portfolio of soft, pale brown canvas, with an embossed title in gold.

Altogether the work is a boon to the poor draughtsman and the toiling architect whose summer vacation can be spent no farther away from home than Saugus or New Jersey, but whose soul yearns for the green fields of Europe.

How came you and I and the rest of us to be architects? Did we feel the unmistakable impulses of an artistic nature? Did we stumble into the track by accident? Or were we not entered in an architect's office by parent or guardian who had been questioning all accessible friends and acquaintances as to what was the best thing to be done with us? More, we take it, have entered on their novitiate at the instance of their elders than of their own motion, and whether these have been successful or unfortunate has depended largely on how thoroughly the parent has comprehended the nature

[1] "*Sketches Abroad:*" Made during a nine months' tour through a part of Spain, Italy, France and the South Kensington Museum, A. D., 1886, by Julius A. Schweinfurth, Architect. Boston, Mass: Ticknor & Co. Price $15.00.

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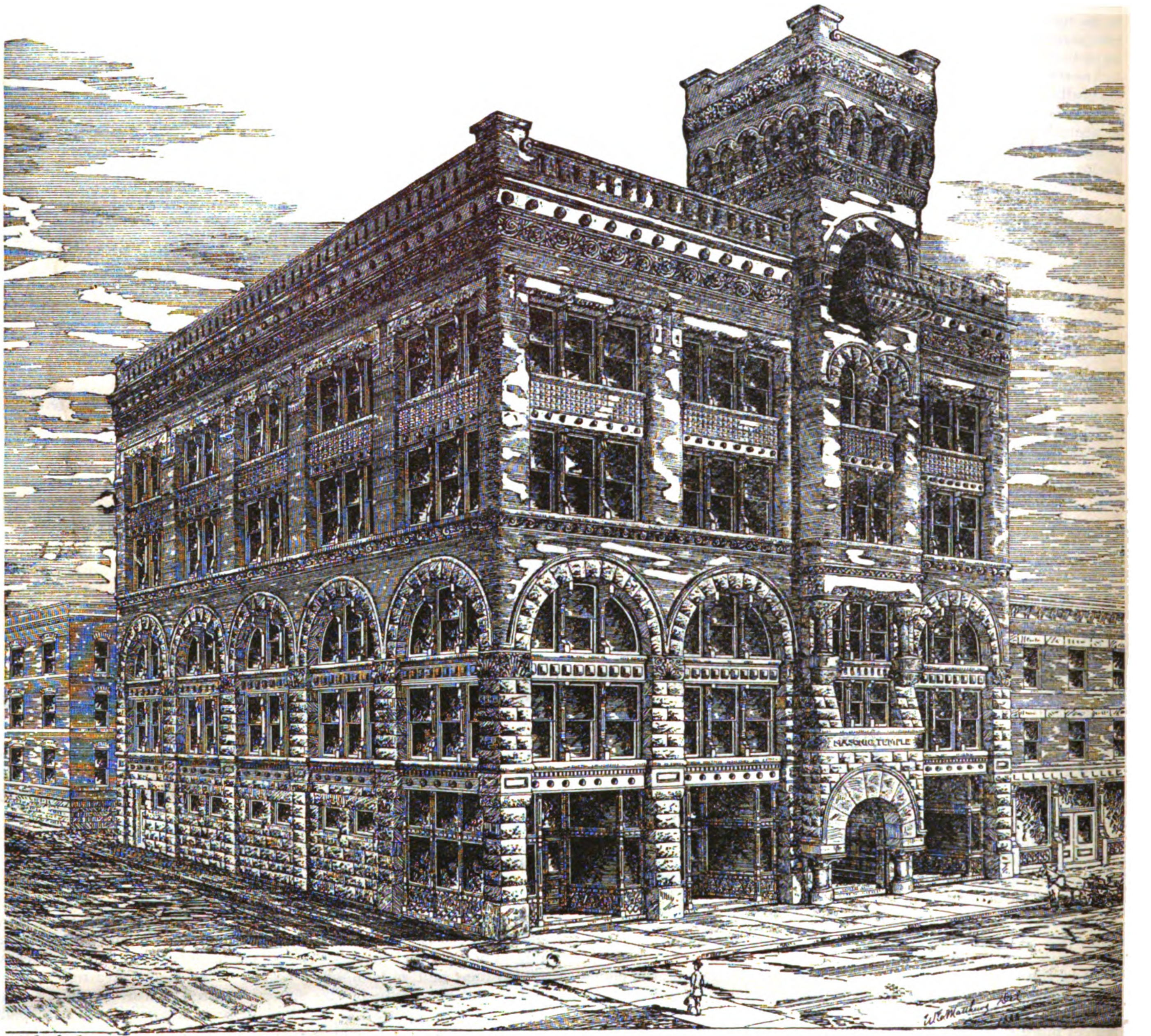
and intellectual capacity of his offspring and how understandingly he has informed himself as to the real nature of an architect's work. The blame for non-success should really rest as often on the father as on the son, and if the former took proper steps to measurably understand the work and the intended laborer, our offices would be cumbered with fewer incapables, who can never advance beyond a certain degree of efficiency and usefulness, but must remain through all their lives mere draughtsmen who can be trusted to do only certain kinds of work, and can never hope to reach the higher grades of that honorable guild, or hope to establish a practice of their own. In other walks of life, however, they might have become as useful and successful as any.

Many a father seeks advice at our hands, as he does at the hands of other architects, and we think that in future we will suggest that if both father and son will carefully examine the book [1] on architectural drawing written by Mr. Spiers they will both be helped in reaching a decision, for it will show very clearly what one part of an architect's work is, and will cause the elder to consider whether from what he knows of his son's character it is likely that he can in due time accomplish the results here shown, and will cause the younger to appreciate from the start that even in the matter of drawing persistent hard work lies before him.



Design for Masonic Temple Richmond Va.
J. B. Legg Architectural Co.-Architects St Louis Mo

The book was never prepared with an idea of being used in this way, and it will probably astonish the author that this use is the first that occurred to us as we turned over the pages. There have been many books written on architectural drawing, but never one like

[1] "*Architectural Drawing*," by R. Phené Spiers, F. S. A. Architect. 1888 Cassell & Co., limited: New York, London, Paris and Melbourne.

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this. It is the work of a man whose own skill as a draughtsman is well known, and whose methods and ideas have become crystalized in many years which have been partly occupied in giving advisory instruction to architectural students. The *magister* is throughout subordinated to the artist. The man who speaks is one who realizes that he is addressing pupils in the main intelligent, who can seize on an idea or a hint and develop it logically. The actual method of doing this or that is not given undue prominence, as it is in many other books on drawing, but attention is constantly directed to the real object of all drawing, the production of a well-defined effect. Conscientious students of other books would at the end of their studies produce drawings essentially alike and all modelled on the manner of the author of the book; but students of this book would probably produce drawings of a similar object in a distinctly dissimilar but thoroughly individual manner, for instead of the illustrations all being prepared in the same style — that of the writer or some draughtsman selected by him — these twenty-five full-page plates show in most admirable reproductions how drawings of different classes of work were made by fifteen architects, most of whom are as well known by their work to Americans as to Englishmen. Such men as R. Norman Shaw, H. H. Stannus, Alfred Waterhouse, G. E. Street, Ernest George, J. L. Pearson, Gerald Horsely and others. These drawings were not prepared for this work, but were selected by the author as best illustrating the many different ways in which an architectural drawing can be rendered.

In the same way that illustrated books form the most valuable part of an architect's library, so these plates form the most helpful part of this book, for in the development of the artistic side of his talent the architect receives his best training through the eye, not through the ear — Ruskin's words generally excite a doubting or combative feeling, which can only be allayed by setting before the eye an illustration in support of the contention he is advancing with such affluence of verbal argument — so these illustrations do more to explain what can be done with pencil and brush than would the most careful description that Mr. Spiers could contrive.

Perhaps the most interesting and instructive chapter is the one on office-work, and, so far as we know, it is the only successful attempt to describe and explain the commonplaces of ordinary office procedure, which the student commonly has to pick up as he can in the course of his day's work, applying his own explanations to processes that he sees advancing under his own eye. The plates which illustrate this chapter show how possible it is to make a working-drawing that is thorough and workmanlike in the information it gives, and is a rebuke to those who feel that any sort of rough and incomplete drawing will serve the purpose. A thoroughly-good working-drawing is more valuable to both architect and client than the most elaborate of picture perspectives, for it has an inspiriting effect on the workman and enables him to go ahead with his part of the work with the feeling that it is all plain sailing before him, and that he has not got to waste time in trying to guess what may be the real meaning of the imperfect drawings which have been furnished him. The thorough working-drawing makes the work of the architect vastly more easy, too, in the matter of superintendence, for it enhances his authority with the workmen, who, feeling that they are dealing with a man who really understands his business, are quite willing to follow his instructions to the letter, so far as possible. In nothing more than in the character of the working-drawings made there does the good office differ from the poor one. Mr. Spiers's book is not precisely an elementary treatise and it does not give all the facts connected with the theory and practice of constructing drawings of different kinds. It is mainly suggestive and the suggestions are carried to their legitimate conclusions by the illustrations.

NOTES & CLIPPINGS

Back-handed Railway Building in Persia. — The opening of the first railway in Persia, from Teheran to Shah-Abdul-Azim, has provoked more congratulation than ridicule in this country, probably because the absurd side of the whole affair is not properly understood. The concession for the line, which eventually is to connect Teheran with the Caspian Sea, is in the hands of a Belgian syndicate, in which a Mr. Zaitchenko, Persian general-consul at Odessa, and several other Russians are concerned. The imbecility of the affair to which we are about to refer, is due obviously less to the syndicate than to the Shah, the vagaries of whose rule are responsible for the present degraded condition of the country. From the Caspian to Teheran is a distance of 200 miles, and seeing that there are no roads worthy of the name between, and the Elburz chain has to be crossed, any European would naturally have commenced at the sea end first and worked towards Teheran; particularly as the rails were sent to the Caspian from Europe via the Trans-Caucasian Railway. However, regardless of the cost, the Teheran end has been started upon first, and thus the ridiculous spectacle has been witnessed for months past of donkeys, camels, and horses tugging loads of rails and locomotives in sections from the Caspian, 200 miles to Teheran, in order that the lines might be built the wrong way. Thanks to this, although there are no engineering difficulties at all on the section just opened, the cost has exceeded 10,000*l.* a mile, or 100,000*l.* for the ten miles opened. Of this amount, even after subtracting the 15,000*l.* which Russia charged as duty on the rails, etc., it is estimated that nearly half, or 45,000*l.*, has been entirely wasted in transport expenses from the Caspian to Teheran. Latterly, accounts have appeared in the press of the Shah having spontaneously thrown open his country to trade and inaugurated a new era. The same thing was said fifteen years ago when he gave a famous concession to Mr. Reuter, and on the strength of it was enabled to perform several cheap journeys to Europe and return laden with presents. Subsequently, however, his government relapsed into its previous imbecility, and if the present railway farce is any test he cannot be said to have recovered from it since. The fact of the matter is, Persia, to-day, is nothing more than a Central Asian Khanate, like Bokhara, and it is useless to expect serious improvement from its present ruler. Two adjectives are to be plentifully found in every book describing Persia for the last twenty years, "imbecile" and "idiotic," and although the construction of the Teheran Railway is a very silly affair, it is rational compared with many acts of the Persian Government recorded by travellers, while at least ten miles out of 200 have been completed. — *Engineering.*

Sham Antiquities in France. — Now that the time is approaching when the summer resorts of Brittany and Normandy will be patronized by seekers after fresh air, it is well (the Paris correspondent of the London *Daily Telegraph* remarks) to draw attention once more to an old subject. Among the English as well as the French visitors to such places every year there are numerous antiquarians, collectors of ceramics, and those whom the American humorists facetiously calls "Bricabrackers." Now the members, or rather imitators, of the "Black Band" are as numerous as ever in France, and they still take a diabolical and professional delight in entrapping unwary antiquarian tourists by offering sham curios, articles of vertu, pottery, coins, and medals for sale. These people cunningly distribute reputed antique bedsteads, chairs, *bahuts*, medallions, and pottery-ware in old farmhouses near watering-places. The guides, hotel-touts, villagers, and similar folk are told to sound the praises of these things in the ear of the tourist, who is flattered and delighted at the prospect of being able to pick up a bit of genuine old china, a *rococo* cabinet, a jar of "Old Gaul," and perhaps a buckler or javelin owned by one of Cæsar's legionaries. The diplomatic guide or tout is never gushing about the antiquities; but he generally insinuates in an off-handed, distant kind of a way that he knows or has heard of some old woman living leagues off who had kept such things in her family for years. The amateur antiquarian goes to the *bonne-mère*, who shows him her collection and narrates their history; how they were heirlooms from her mother, who had been in the château of a local magnate, and had hidden them at the time of the Revolution, and so on. Of course the *bonne-mère* could not, on any account, part with the things; but, as monsieur is so pressing, she has no objection to letting him have some of them at fair price. The amateur then goes on to bid for the articles, and finally departs with half-a-dozen old plates, a couple of jugs, or a rusty javelin, deeming himself lucky to have found his curios himself. Next day the bric-à-brac dealer from Paris receives notice of the successful sale, and he at once proceeds to pocket the pelf, to pay the usual percentage to all his confederates, and to replace the curiosities sold to the innocent and unsophisticated stranger by others. Thus the trade in the sham antiques goes on from year to year, and, despite exposures, there are still numerous victims annually.

The Canals of Mars.— The canals of Mars were carefully observed at his last opposition, on April 11th, by M. Perrotin, the director of the observatory of Nice, under the best conditions, for the situation of the observatory is one of the finest in the world, and its telescope is large in size and excellent in definition. M. Perrotin also closely observed the so-called canals at the opposition of 1886. He found the canals, observed in 1888 in general, in the same position and presenting the same characteristic features as those of 1886. They crossed the continents in straight lines, some of them being single and others double, cutting each other at various angles. Their object seemed to be to establish communications between the seas of the two hemispheres, or between different parts of the same sea, or between the canals themselves. M. Perrotin saw something beside correspondence in his two series of observations. He bears witness to remarkable changes that have occurred between the two oppositions, not only in the canals, but on the surface of the planet. He found that the continent Lybia had entirely disappeared. Plainly visible two years ago, it no longer exists; it has been engulfed in the surrounding sea. Lake Mœris, in this vicinity, situated on one of the canals, has also vanished from sight. The extent of the region whose aspect is thus completely changed is a little greater than the surface of France. A new canal, invisible in 1886, has appeared about 25° north of the submerged continent, parallel to the equator. A third change was observed in the appearance of a kind of canal on the white spot that marks the northern pole of Mars. Its object was apparently to connect through the polar ice two seas near the pole. M. Perrotin is an astronomer who inspires confidence. His observations are no fiction of the fancy, but faithful transcripts of the wonders revealed to his practised eye on the surface of the planet Mars. Terrestrial astronomers seem at last to have reached a standpoint from which they can observe some of the changes that are taking place on the real surface of one of the planets. It is to be hoped that the opposition of 1890 will be the means of increasing our knowledge of what is going on in the domain of our ruddy neighbor.— *Providence Journal.*

Inability to Recover a Stolen House. — A case of unusual character has been placed in the hands of Lawyer Stevenson to apply a remedy. A landlord leased to a tenant a plot of ground, upon which was a frame house, but in the lease no mention was made of the structure. The tenant took possession of the land, and with a woman who was not his wife occupied the house. He fell considerably in arrears for rent, and a landlord's warrant was placed in the hands of a constable to levy upon his goods. Upon attempting to serve the warrant the constable discovered that the tenant had removed the house with its contents, to another man's land, and consequently the warrant could not be served. The defaulting tenant subsequently died. The question propounded to Mr. Stevenson was, What was the original landlord's remedy? After hunting up authorities Mr. Stevenson came to the

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conclusion that the house, though while upon the land a part of the realty, when it was removed to another place, and thus severed from the realty, became personal property, and subject therefore to be replevined by the landlord. But he found that the replevin was barred by the Statute of Limitations. The woman, who still occupies the house, though she was never a tenant of its owner, holds the fort, without its having cost her a penny, and though a prosecution for larceny for stealing the house might have been at one time maintained, such a proceeding is barred by the criminal statute.—*Philadelphia Inquirer.*

Les Amis des Monuments Parisiens.—The atrocious meteorological conditions under which Paris has to be visited just now have not kept away foreign visitors from the Boulevards. They are arriving in considerable numbers from all parts, but particularly from Great and Greater Britain, and they are what is termed by facetious chroniclers *trimbalés*, or "carted round" from monument to monument every day. No ridicule can, however, be attached to their movements now that thousands of Parisians have themselves set to work to discover the sights and scenes of their wonderful city and its environs. The big *char-à-bancs* that you see slowly dragged along the Boulevards laden with people very often contain full-blooded Parisians as well as benighted barbarians from beyond the shimmering seas or the snow-clad hills. The time has gone by when a Parisian was ashamed to carry a "Baedeker" under his arm, and to explore the wonders of the Louvre, the Luxembourg, the Gobelins, or the Musée-Carnavalet. M. Charles Garnier and the society of "Amis des Monuments Parisiens," which he founded about two years ago, have changed all that. Before M. Garnier and the ladies and gentlemen with him took to periodical wandering all over mediæval and artistic parts of Paris there were thousands of old inhabitants who had never seen the inside of many of the metropolitan monuments and places of historic interest in their lives. They have visited the Engardine or the Tyrol for scenery, cursorily inspected the frescoes and paintings of the Pitti or the Vatican to improve their taste, but they would not be seen for worlds lounging about the corridors of the Louvre or penetrating the artistic or Arcadian recesses of Versailles. At the present time, owing to the fashion that has been set by the "Amis des Monuments," it is no uncommon thing to see a genuine Parisian wrapped in contemplation of "La Belle Jardinière" at the Louvre, or wandering enthusiastically, like a foreign *dilettante*, through the Hall of Mirrors at Versailles. As to the environs of Paris, such as Marly, Montmorency, or St. Germain, they are rendered more fashionable than ever by the patronage of the opulent people who drive thitherward in mail coaches every afternoon for dinner.—*London Telegraph.*

Electrical Sunstroke.—M. Defontaine, doctor-in-chief to the Creusot Steel-Works, states that workmen employed in operating the electric forges at Creusot are subject to a form of sunstroke which he attributes to the intense light radiated from the focus of the forge. These forges emit a light of more than 100,000 candles from a few square centimetres of surface, producing on men exposed to their glare physiological consequences previously unheard of. Frequently after two or three hours' work the men complain of pains more or less intense in the neck, the face and the forehead, simultaneously with which the color of the skin is changed to a reddish brown. Notwithstanding the use of dark glasses the retina is affected to such a degree that for some minutes after ceasing work the operatives are totally blind, nor is perfect vision restored until nearly an hour after. The secretion of tears is augmented, a constant flow being kept up for twenty-four hours, during which the patient suffers from insomnia, due to pain and the abnormal flow of tears, and possibly also to fever. During the following days the skin peals off the face and neck, which become of a deep red color, fading away about the fifth day.—*New York Star.*

The Result of Dredging at Ghirgenti.—In the harbor of Ghirgenti (the ancient Agrigentum), a dredge boat recently struck a bonanza of ancient coins and curios, including a cartload of plate and numerous Grecian statuettes, Agrigentum having been, next to Syracuse, the most flourishing colony of the sea-faring Greeks. A correspondent of a Naples journal regrets that the municipal authorities of Rome have thus far prevented a thorough dredging of the Tiber, where untold shiploads of antiquities are supposed to await a day of resurrection. The chief objection seems to be the enormous stratum of superincumbent mud, and the probable consequences of raking up the sewer deposits of twenty-six centuries.—*Dr. Oswald in Drake's Magazine.*

Economy as it is Understood at Panama.—A correspondent of the *Montreal Gazette* writes as follows:—"I have referred to the shameful way in which valuable plant is used. Now to cite a fact, to point a moral and adorn an 'o'er true tale.' Quite recently a new 4,000 kilo. *grue*, or movable crane, went off the line near the Culebra cut. They cost $2,500 each. Down the slight embankment it went. The intelligent foreman of that section, instead of making any effort to recover it, simply buried it by ordering in a train of dumping cars. The crane was buried and remains buried. Its burial simplified the whole matter. It was not his, and the company had dozens idle. Words fail to convey any idea of how machinery has been used there. An engineer told me that three-fourths of the $30,000,000 worth of machinery on the Isthmus is rusting and much of it is useless, valueless even as old metal, owing to its location. The Canal company takes credit for $30,000,000 worth of machinery on the Isthmus."

African Dwarfs.—Emin Pasha has discovered a race of dwarfs which inhabit Central Africa. They are only forty inches high, of a brown color and very agile. They eat white ants and roots, and use small poisoned arrows.—*Springfield Republican.*

A Scheme to Reclaim the Arid Regions of the West.—The Senate spent the greater part of July 30, in discussing an amendment to the Sundry Civil bill which looks to the reclamation of lands in the arid regions, for agricultural purposes, by means of a system of reservoirs and irrigating ditches. The amendment was finally passed by a vote of 29 to 18, which is a substantial victory for the friends of the amendment, since the proposition had not been favored by the Committee on Appropriations, on the ground that it would open the doors to a scheme which would involve the outlay of millions. The amendment adopted is only tentative in character. It provides for an appropriation of $250,000, to be expended under the direction of the Geological Survey, in the examination of the whole subject, in surveys and other necessary preliminary work. According to the statement of Major Powell, the director of the Geological Survey, the work of surveying the arid region alone will require $5,000,000. The work of constructing even the simplest sort of a system of reservoirs would require, according to the estimates of those who opposed this scheme, $20,000,000.

TRADE SURVEYS

One of the favorable features of the hour is the decrease in the loss due to competition. Trade and commercial combinations of all kinds are helping to bring this about through the restriction of production and the fixing of prices. Five years ago this would have been impossible, and efforts and combinations which to-day fail will in five years' time succeed. The sweeping bankruptcies of the past were losses only to individuals. The general public profited by the production of wealth. Competition has exhausted only one field, viz.: that occupied by traders and manufacturers. There are other fields for competition to till, such as competition between investors for opportunities, competition between money-lenders, competition between railroad-builders for territory to use, and competition between the seekers after opportunities of all kinds wherein labor, skill and enterprise can find employment. Competition in this direction has only begun. So far as mere cheapness is concerned, the limit has probably been reached. The next thing to watch is that expanding demand will not force prices up too high. Of this there is some probability. There is, of course, more producing capacity than is or for some time can be employed. Shrewd manufacturers who have seen the giant-like strides of American enterprise know that the nation may wake up some morning and discover stocks low and prices advancing. Two or three influences that may bring this about are these: First, the enormous volume of money that is seeking investment, and second, the fact that immigration will be restricted and labor increased in cost and value. That railroad building will boom again into old-time dimensions is probable. The entire system is gradually getting a stronger foundation to rest upon. The capital foreclosed during the first six months of this year was only twenty per cent of what it was for the first six months of last year, but the volume of capital placed under receivership was six times as much. There are several thousand miles of railroad iron in the hands of receivers or threatened with that fate. Considering the rash way railroad building has been conducted, it is a wonder that there is not ten times as much weakness. Railroad managers expect a sweeping improvement as soon as these several thousand miles can be brought under their control. There is a gradual transfer going on. Despite the unfavorable situation of railroads, a great deal of new work is projected. The depression will be corrected probably within six months. The best railroad management in Boston, New York and Chicago looks forward confidently to a restoration of harmonious relations and to a resumption of work on a large scale. General construction work is progressing very well, and a great deal more is being put in a forward condition. Financial schemes are being worked up to a practical point, so that when the safe time does come there will be nothing to do but begin construction. An authority estimates that schemes involving the expenditure of two hundred million dollars are all completed. Money that otherwise would go into railroad building will now go into manufacturing. Dividends will decline on railroads, but increase in manufacturing. The purchasing power of the people will be, as it is being, increased, and larger and more valuable interior markets will be built up. Business men feel like drawing a long breath over the end of the tariff turmoil. The politicians' holiday is over and the questions are now relegated to the people. The fear of harm coming to them will have more weight in deciding the question than the possibility of advantage. Changes of State policy or economy have always been made only as the last resort. There may be a vast amount of clatter about monopolies, but the individual supply of bread and butter will be considered first, and whatever seems to best secure these will be adopted and defended. The iron trade is getting into good shape. The mills all over the country are starting up and spring prices are ruling. The steel-rail mills have next to no business on hand and but little early business is promised. The lumber trade is in as good shape as it could be, considering the fact that market requirements have been covered to their fullest extent. The textile manufacturers are hoping, with some reason, for a further improvement. The paper-makers are generally full of orders. Boot and shoe makers have made and sold more shoes this year than last. Boiler-makers and engine-builders, car-builders and locomotive-builders have done more work this year than last. The railroad-builders have fallen away behind. The production of iron and steel is about one million tons behind. The makers of machinery in general are ahead. The agricultural interests are more prosperous because cost of traffic in many sections has been reduced and cost of most articles of consumption has declined. The mining interests have been well engaged. Coal production keeps ahead. Industrial demand, railroad demand and householders' demand all are greater than a year ago. Prices for anthracite are to be advanced September 1st. The production this year has been one week's labor greater than last year. The banks have money to lend, but find commercial paper less abundant than usual. A larger volume of business is now done on less borrowed money than ever before in our history. Borrowers are fewer in numbers. There is less mortgaged indebtedness throughout the East than in former years, more throughout the West. The money market is in excellent condition. Speculation is at a low ebb. Legitimate dealing is more general. Trusts have a hard time ahead of them and legitimate business interests have fairer prospects than ever for moderate earnings and less prospect for the enormous profits which in years past have made the fortunes of the few in a short time.

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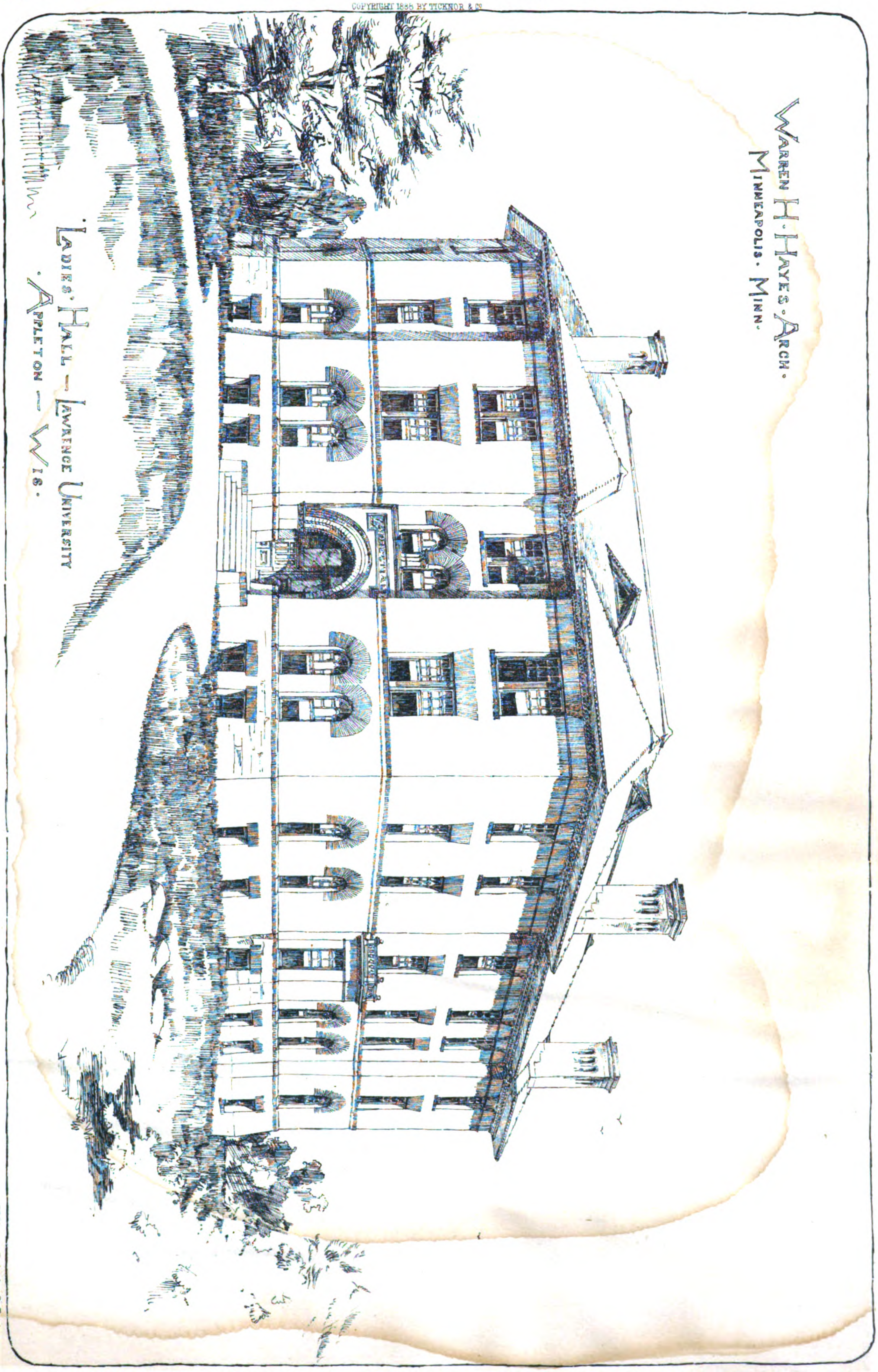

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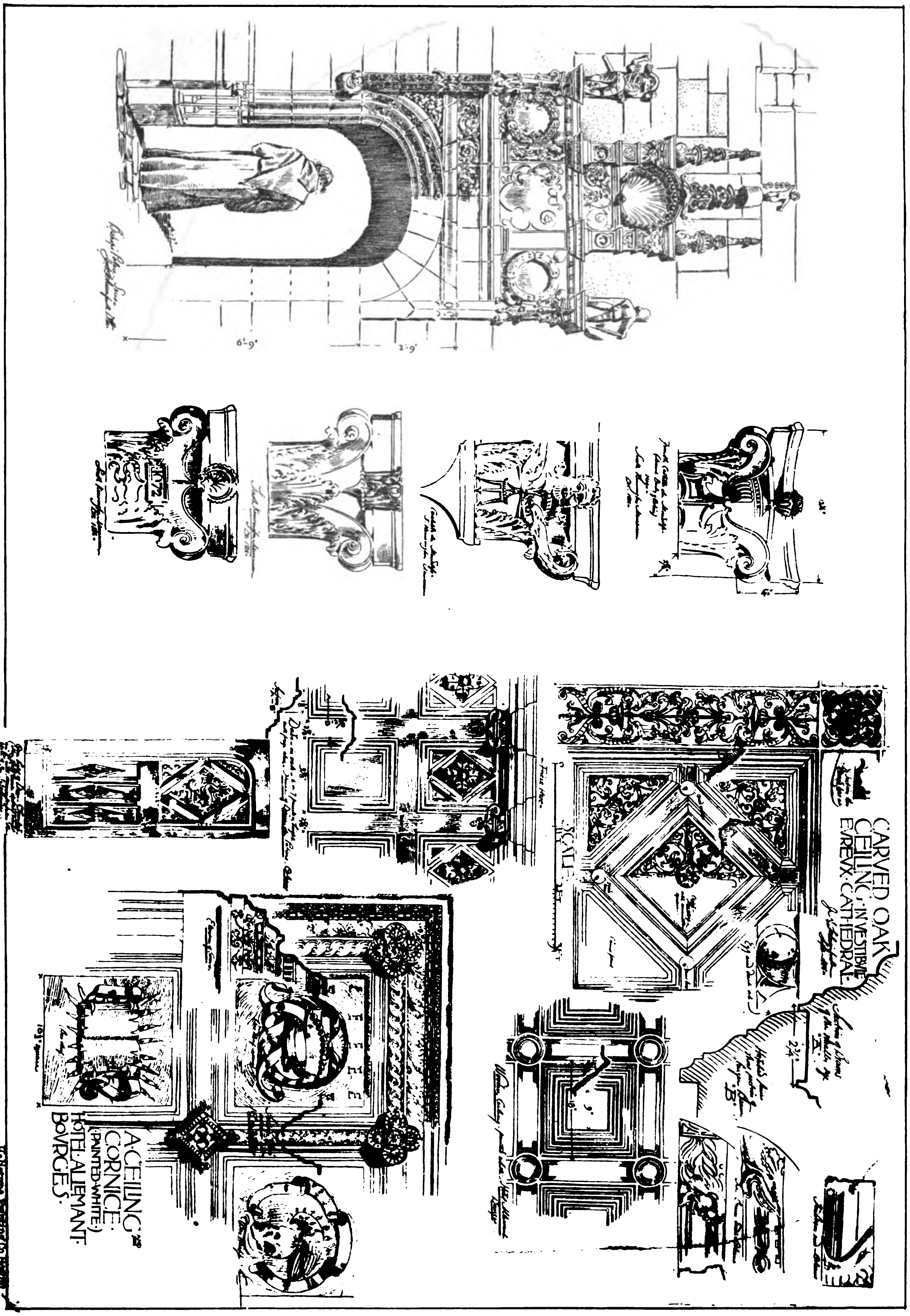

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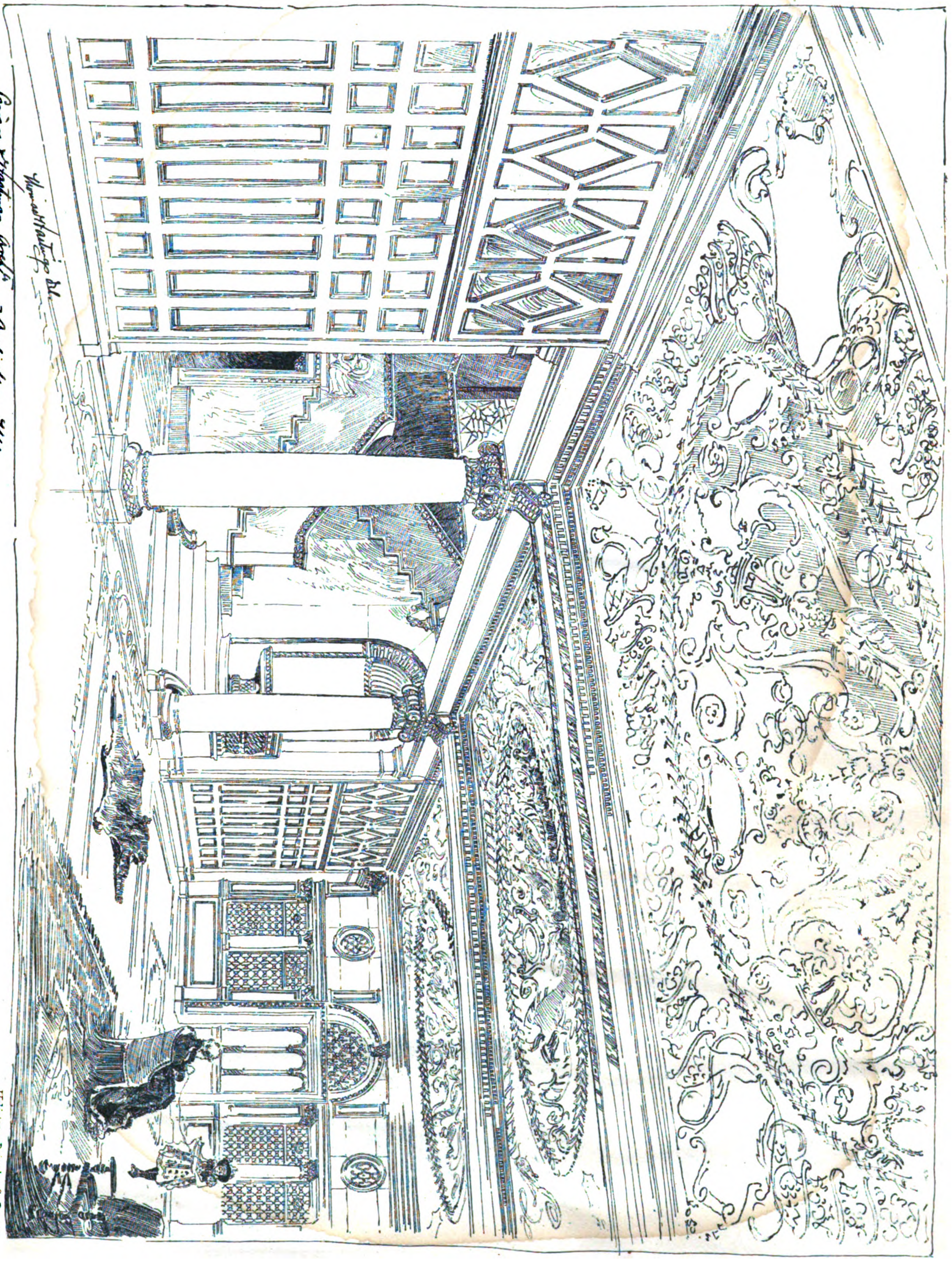
Perspective Sketch of Hall:
House of Mr Wm Rockefeller.

Carrère & Hastings Archts. 3 Broadway New York.



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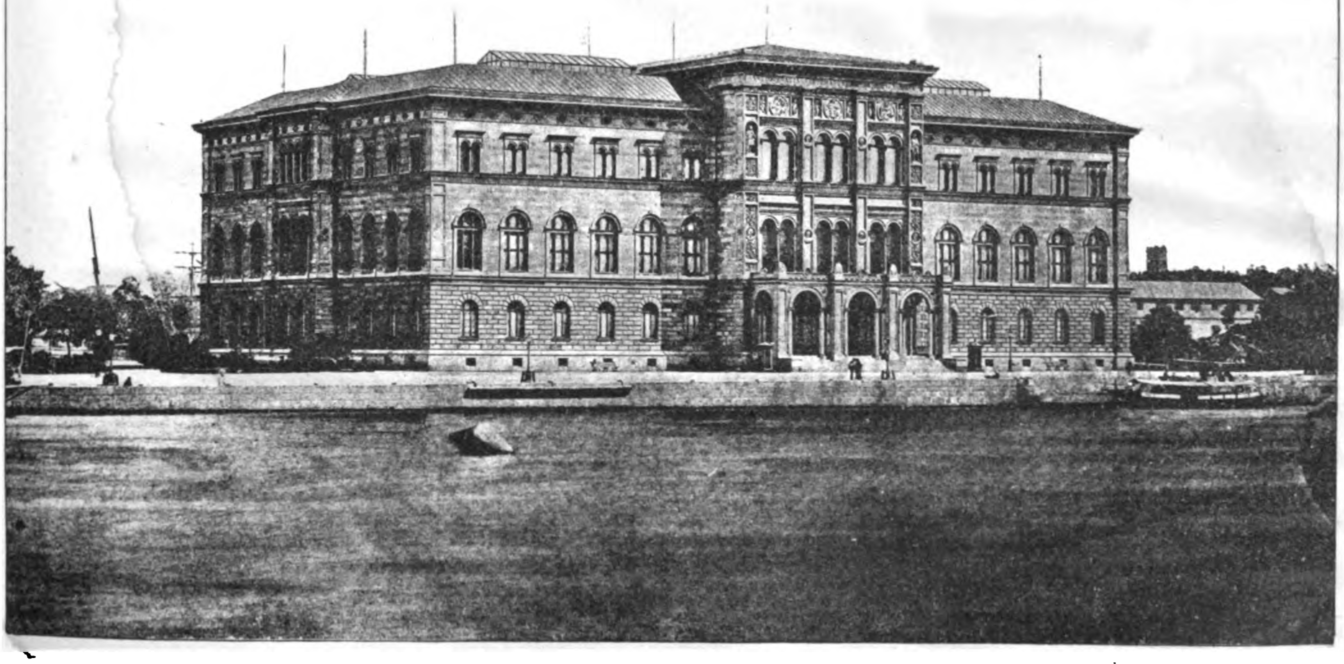
The Royal Library, Stockholm.



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The National Museum, Stockholm

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St. Catherine's Church, Stockholm.

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The Old House of Lords, Stockholm.

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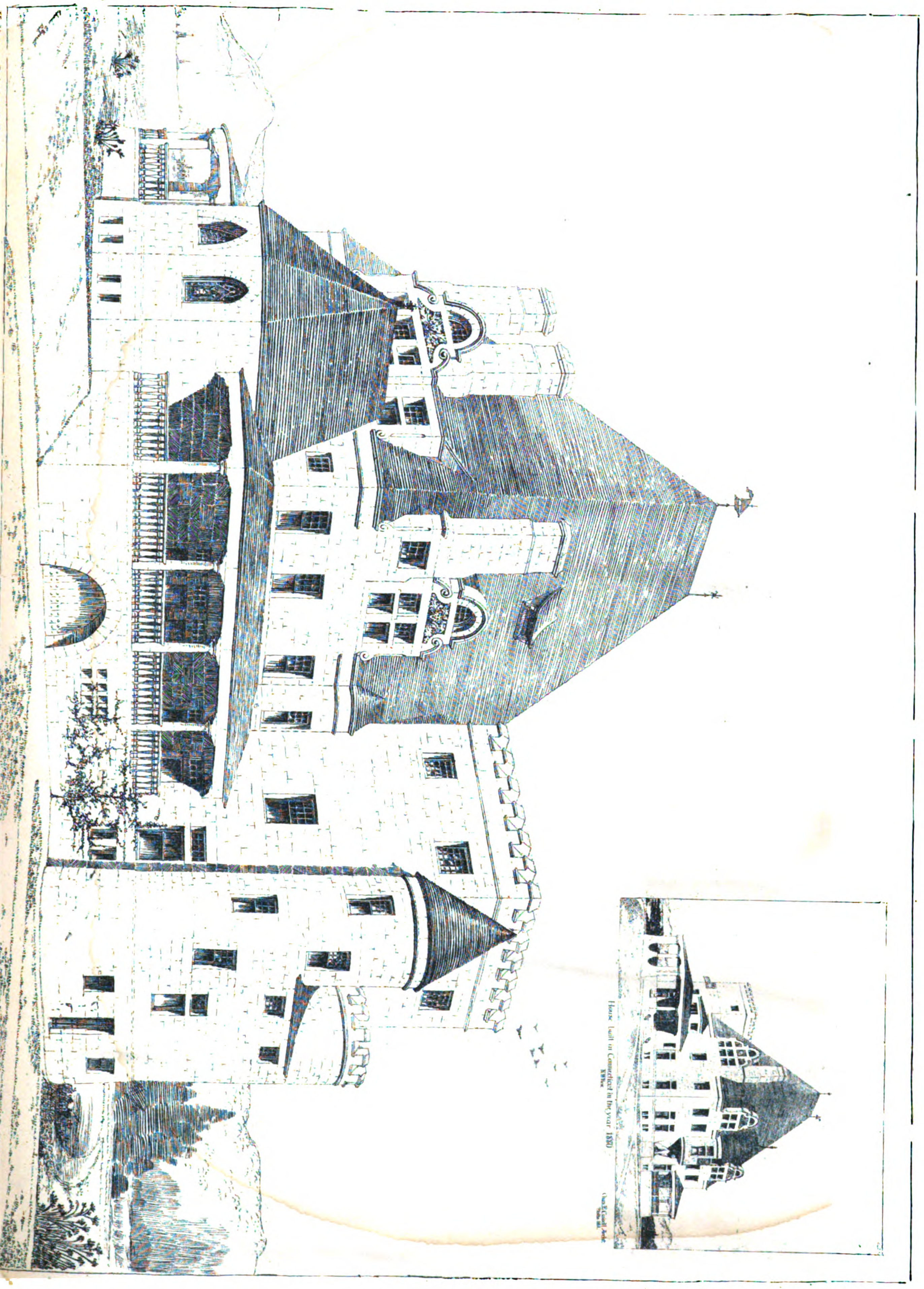

House built in Connecticut in the year 1880.

Chas. F. Cassell, Archt.

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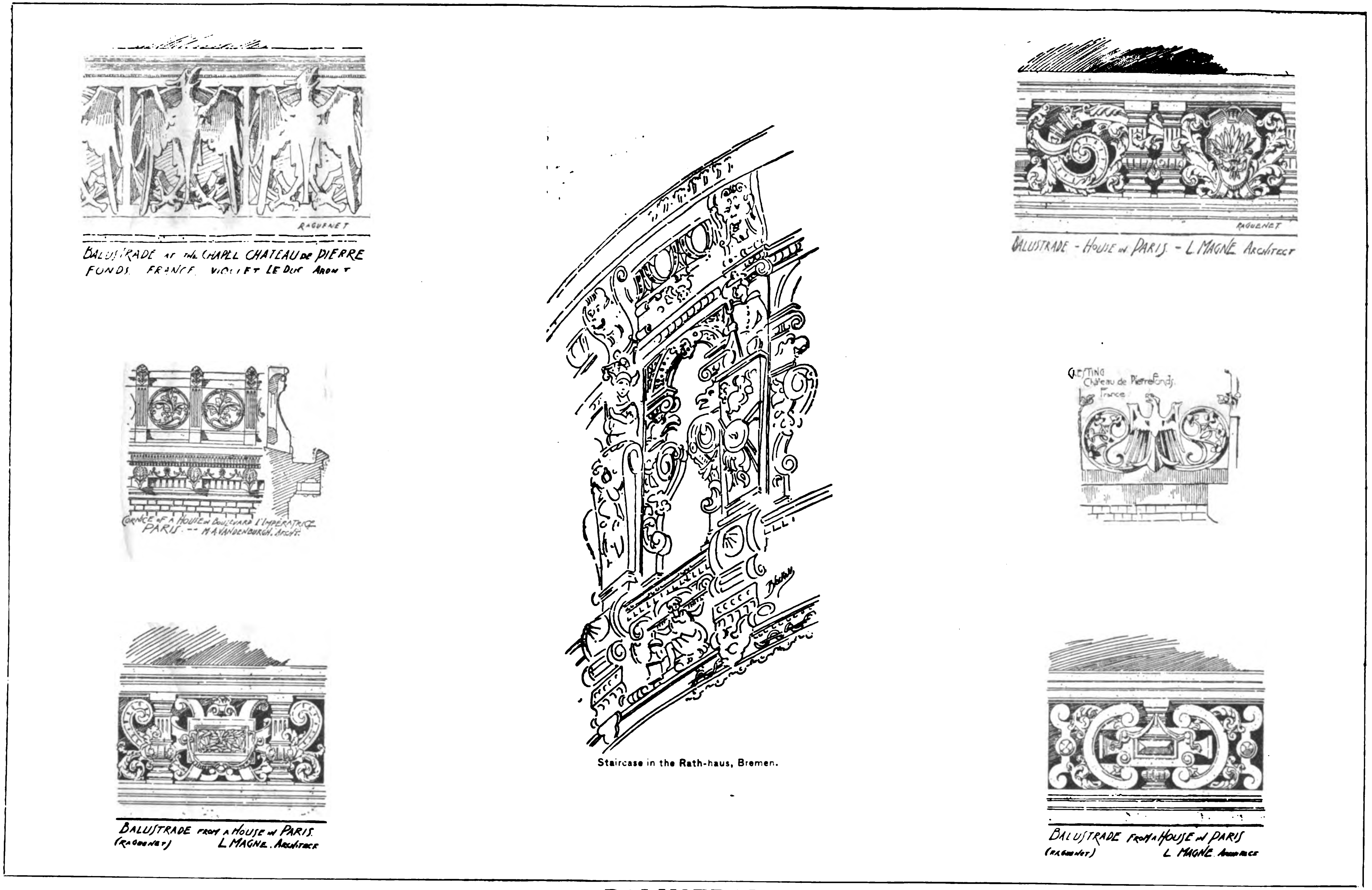

Staircase in the Rath-haus, Bremen.

BALUSTRADE.

// THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIV. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 659.

AUGUST 11, 1888.

Entered at the Post-Office at Boston as second-class matter.

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THE Congressional Library muddle has been still more confused by a vote of the Senate, refusing to concur with the House of Representative in ordering work on the building to be stopped, and proposing as a substitute, that it should go on, but for the future under the supervision of engineer officers of the army. While such supervision would be better than that of a commission of amateurs perfectly ignorant of the work which they control, it would be more costly, and much less suited to secure creditable results in the way of arrangement and details of design than the supervision of the architect who is responsible for the plan. This is the sort of supervision which is employed in all civilized countries in similar cases, and is found to be most satisfactory and economical; and no one has yet explained why the same method should not be found most suitable in this country. In the debates in Congress it is darkly hinted that "jobs" exist under the surface of the contracts for the Library, and the importation of army officers seems to be intended as a menace to civilian corruption. In our own mind, we are satisfied that no dishonest intention has ever entered the minds of either the architect or the Commissioners. In reading the "charges" and counter-charges, rumors, hints and innuendoes about men in high public station in this country, we are often reminded of Cardinal Mazarin's remark to an official colleague, who was greatly disturbed by the accusations of corruption rained upon them in the newspapers. "Don't pay any attention to them," said the minister, "these people are only showing what they would do if they were in our places;" and we have not yet seen, in the printed accounts of the Library affairs, any indication whatever of anything worse than foolishness and ignorance on the part of the Commissioners, and a lack of deference to the feelings of disappointed bidders on the part of the architect. The scandals about the employment of women as "drivers of carts," and so on, ought evidently to be laid at the door of subordinates, who are, to say the least, not too carefully selected by politicians anywhere, and least of all in Washington; and the best way to avoid them is certainly to give the architect the customary fees, and let him pay out of his own pocket such computers, tracers, and other assistants as he requires, while the contractors pay their men, and are themselves paid by the yard, perch, square or other suitable measure for the work they do, which can be readily measured, and the prices approved by army, or other engineers, if Congress is not willing to trust Mr. Smithmeyer, before the payments under the contract are made. As to the plan of the building, which some of the newspapers still object to, we can only repeat that it has been chosen by the official representatives of the Government out of a considerable number of competing designs, and authoritatively adopted, and if it is now to be modified the Government should bear the expense — not Mr. Smithmeyer, who has simply obeyed orders. To bring up the ideas of Mr. Poole, of Chicago, as a reason for depriving Mr. Smithmeyer of his great commission is both unfair and mean. All architects know that Mr. Poole and Mr. Spofford, the Librarian of Congress, and a member of the original Commission which selected the plan, differ radically in their ideas of the proper arrangement of such a building, and if Mr. Smithmeyer, as is not denied, followed the programme which Mr. Spofford, both as the head of the Library itself and a member of the Commission, imposed upon him, he has only done his duty, and Mr. Poole himself, however erroneous he may think this programme, would, we are sure, be the last to wish to see his criticisms used as a handle for dislodging the man who faithfully and intelligently followed it. The *Philadelphia Press* proposes the appointment of a mixed Commission of architects and librarians to prepare new plans, to be substituted for those adopted by the original commissioners; and there is some merit in the idea of retracing the steps that have already been taken, and beginning afresh, with just such a jury to decide upon plans as ought to have decided upon them in the first place; but this can, and should be done without injury to Mr. Smithmeyer, and both he and Mr. Spofford, the two men who understand the problem best, ought to be members of the new commission, if there is to be any.

THE New York Architectural League has issued a very timely notice of its exhibition of work in architecture and the allied fine arts, which is to be held next winter, commencing December 27, 1888, and closing January 12, 1889, at the galleries No. 368 Fifth Avenue. The League invites architects, artists, sculptors, decorators, and workers in wood, metal and textiles, to contribute examples, and reminds them that a large space is at the disposal of the managers, and that by giving notice so long beforehand they will have ample time to consider their contributions. The League exhibitions have now become important events, calling out a great deal of interesting and beautiful decorative work, as well as architectural drawings, and the next one promises to surpass all that have preceded it. Detailed information, and blanks for intending exhibitors, may be obtained from the Secretary, Mr. F. A. Wright, 47 Liberty Street, New York. It is, by the way, intended to establish the League in a house of its own before long. A scheme has already been prepared for assuring the income required for meeting rent and expenses, and the members look forward to a future of greatly increased usefulness for their energetic society.

THE *Sanitary News* describes a new plumber's trick, which has been first discovered in Milwaukee, but may be known elsewhere, so that architects and inspectors will do well to be on their guard against it. In Milwaukee, as in many other towns, all soil-pipes put up in dwelling-houses must be tested by filling with water. A certain firm, knowing that a defective pipe had been used, contrived to plug it with clay, so that the water applied for testing it did not enter the pipe at all. It is not stated how the inspector happened to find out this ingenious deception, but plumbing inspectors become wonderfully expert in observing suspicious indications, and the offending firm was reported, and punished by having its license revoked until the defective pipe should be replaced by a new one. Most persons will say that the revocation of the license ought to have been made permanent.

THE *Sanitary News* mentions also a piece of public sanitation which ought to be made as widely known as possible. People who read the newspapers will remember the angry discussion over the employment of bromine by the New York Board of Health, to disinfect the foul earth thrown out of street excavations; and the *Sanitary News*, in speaking of this, recalls the fact that a few years ago, during an epidemic of diphtheria and scarlet-fever in Detroit, Dr. O. W. Wight, the famous health officer of that city, determined to disinfect the sewers. For this purpose seventy-four thousand pounds of sulphate of iron were dissolved and poured into the sewers, and three tons of sulphur were burned in iron pails, lowered into them. Besides the cleansing of the channel, due to the

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iron sulphate, the sulphurous-acid vapors from the burning brimstone penetrated the whole system of sewers and house connections, and the result was a great abatement of diphtheria, and the almost entire disappearance of scarlet-fever. We hope that this experiment, which is not so generally known as it should be, will be frequently and extensively repeated in other places. Even by the scale of the political economists, an average American child is worth a great many tons of brimstone and copperas, and the whole cost of the Detroit disinfection would be returned with a profit by the saving of a single life; while, if the results should generally agree with those obtained by Dr Wight, we might even hope, by systematic efforts, made simultaneously in our great cities, to accomplish, what physicians tell us is possible, — the complete extirpation from civilized countries of diphtheria, scarlet-fever and membranous croup, three of the worst diseases that afflict mankind.

THE New York Board of Health, which controls all plumbing work in that city, has adopted a new specification, or code of rules, for house-plumbing, which went into effect July 1, and, as it will be strictly enforced, it is worth knowing something about. The most interesting point is, perhaps, the total exclusion of ordinary soil-pipe from dwelling-houses in New York, by a clause demanding under all circumstances the quality known to the trade as "extra heavy," the minimum weight of which, for four-inch pipe, is set at thirteen pounds per foot. The rust-joints in iron pipe, once permitted, are now forbidden, and it is not even allowed to use old lead in making calked joints, the code expressly demanding for this purpose "pure, soft pig-lead." In other respects the rules are not materially different from the old ones.

MR. GEORGE AITCHISON, a very good authority, reviews in the *Builder* the discourse of Mr. William Morris, in a recent number of the *Fortnightly Review*, on the "Revival of Architecture." It is hardly necessary to say that Mr. Morris does not think that architecture can be suitably revived except by copying Gothic forms again, and Mr. Aitchison, while he is enough of an architect not to believe that architectural beauty is limited to buildings with one peculiar set of details, is inclined to think that the spirit of the present age is so much opposed to architectural art that there is no hope of its revival until strong public feeling, excited by some great event, or series of events, shall seek expression in great monuments; and the best comfort he can offer to architects who try to train themselves to the utmost in their art is that they do well to be ready in case the wave of enthusiasm should occur in their time. "At present," he says, "the only question that interests mankind is, whether their buildings can be built quickly, and are cheap," and, further, "So intent have we been on our problems, — perfecting steam-engines, boring hills, bridging valleys, producing artificial light, and communicating instantly with the uttermost parts of the earth, — so eager have we been to get rich, that we have overlooked beauty, and so surrounded have we been with every form of ugliness that we have grown callous."

THERE is no question of the truth of the notion that epochs of great art follow some period of peculiar exaltation of public sentiment. Without the terror and despondency which fell upon the Athenians at the approach of the countless hosts of the Persians, and the sudden revulsion to joy at their deliverance, and patriotic pride in their own bravery, and gratitude to their divine protectors, which followed the victories of Marathon and Salamis, we may be sure that the Parthenon and the Erechtheum would never have been built, and the remark with which the Athenians appropriated to themselves the fund accumulated by the allied States for the common defence against the Persians — that their prowess had made the fund unnecessary — shows, if not the honesty, at least the condition of exultation and enthusiasm which was to find vent in the purest architecture and the noblest sculpture that the world has yet seen. In much the same way in England, the providential dispersion of the dreaded Spanish Armada, assisted, perhaps, by the immense plunder brought home by Drake and his friends, was followed by the wonderful period of Elizabethan domestic architecture, and, midway between the two others, the great Gothic epoch of the thirteenth century was also particularly the age of emancipation from the ignorance and slavery of the Dark Ages. For all this, we cannot ourselves quite believe that the people of the nineteenth century are doomed to wait for an incursion of barbarians before they can build beautiful houses and churches, and, furthermore, we are not entirely convinced of the unapproachable superiority of the antique and mediæval architecture over our own. We do not always remember that the Greeks, the Romans and Freemasons worked upon a traditional type, in a way that is impossible for us. Not having to trouble themselves about anything but the details that they were to apply to a structure, the lines or arrangements of which had been previously fixed for them, they had time to bring those details to great perfection. We have ample evidence that when they deviated much from the routine in which they had been brought up, they made slips in design quite as bad as any that a modern architect would be guilty of, and that the development of a style was a development by small steps, each clever man using what had been done before him, but conveying into it a little additional perfection from his own taste or ingenuity. That their example should discourage us is anything but reasonable. It is true that we have no fixed type of architecture, but if we have not that, we have what is better, a far more catholic taste and cultivation than our ancestors. A well-trained architect of the present day is fitted, by his study of antique elegance, to give his buildings a purity of outline which few of the mediævals had any conception of, while his enjoyment of Gothic light and shade enable him to give to his Classical designs a picturesque effectiveness that would have puzzled a Roman. Moreover, if he is one of the very modern school, he will have acquired from the Orientals a color sense, which seems to have been hitherto very little cultivated in Europe, and, if his knowledge of sculpture is not equal to that of the Greeks, it is at least superior to that of any Gothic architect. To bring these gifts and acquirements into effective use, the main thing needful is, as Mr. Aitchison and Mr. Morris would probably agree, a strong sentiment, in the expression of which they should do their best to coöperate. To be capable of being inspired with such a sentiment it is not necessary for an architect to engage in preliminary wars and agitations, although these might give intensity to his feelings. All that is really required is a sympathetic disposition, constant and accurate observation to detect the relation of architectural forms and motives to mental emotions, and a contempt for the cynical worldliness which tries to prevent men from showing their feelings. To be a first-rate architect, as well as a painter, sculptor or novelist, one must have a heart, and must also be modest and truthful enough to be willing to show what is in it to other people, and earnest enough to find one's purest reward in awakening a throb of sympathy with the sentiment one has endeavored to express. There is no want of sentiments for architecture to convey. The pure and tender domesticity of Mr. Nesfield's buildings, or Mr. Norman Shaw's earlier ones, might be emulated in every house to advantage, and, judging by their popularity, the effort would not be wasted. In the design of churches, while the small mediæval examples show us often a quiet, hallowed charm, and the large ones a solemn gravity, which might be reproduced in other forms, the present age has plenty of new and perhaps more active religious sentiments, which can be investigated in evangelical society, or among the heroic soldiers of the Salvation Army, or in the deliberations of a Pan-Anglican Council, or amid the privations of a missionary station, and would well bear to be remembered in the fabrics which modern Christianity is to raise for the worship of Him who is the source of all Christian sentiment in every age.

THE plan for a great suspension bridge across the Hudson River, twenty-seven hundred feet in span, which is now under consideration before a Government commission, and will probably be carried into execution if the commission does not disapprove it, is, it appears, far surpassed, at least in span, by certain telegraph cables, which have only their own weight to bear. In the Madras Presidency, in India, the River Kistna is crossed by a cable, swung between supports five thousand and seventy feet apart, and one has just been put up in China, forty-six hundred and forty-eight feet in span. The versed sine of the curve formed by this cable is five hundred and fourteen feet. The whole weight of the suspended portion is only six and one-half tons, and the breaking resistance fifteen thousand pounds, so that there would seem to be no great difficulty, by building the supports high enough, in bridging almost any chasm by similar ropes, and establishing foot-ways between them.

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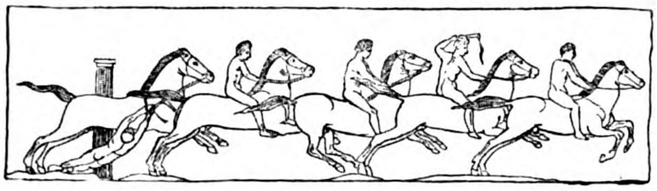
EQUESTRIAN MONUMENTS. — II.

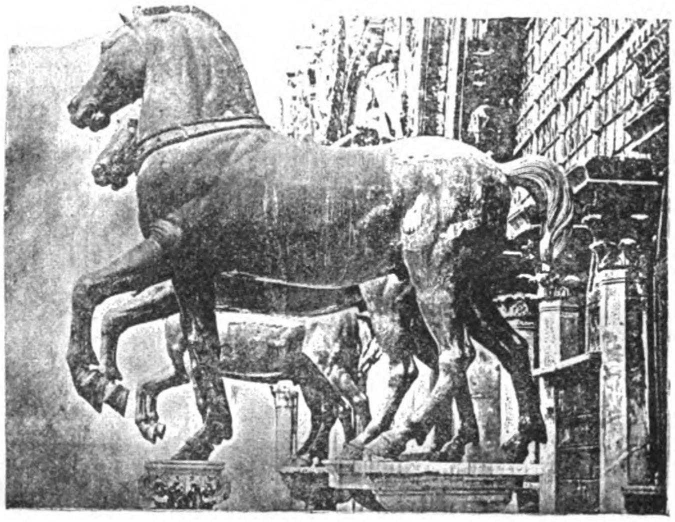
THE HORSES OF ST. MARK'S.



From a Vase.

AMONGST the existing antiques which have a correlative interest for us are the bronze horses of St. Mark's, sometimes ascribed to Lysippus of Sicyon, a contemporary of Alexander the Great, and one of the most skilled of workers in bronze that ever lived. His skill, to which these famous horses bear witness, was fully equalled by his industry, for he is credited with the production of 1500 bronze statues whose character may be inferred from the size and artistic importance of those which are known to us by name, such as the colossal figure of Zeus at Tarentum, sixty feet in height, a colossal Hercules at the same place, which was transported to Rome by Fabius Maximus; while the Farnese Hercules by Glycon, and the Torso of the Belvedere are thought to be copies from originals by him. The large number of his works rests perhaps on the legendary statement that it was his practice to lay aside in a particular place a single piece of gold for every statue he sold, and that at his death 1500 pieces of gold were found in this repository. If the tale be founded in fact there is here a record only of those statues that he had the good luck to sell, and there is no knowing how many remained unsold. Where are they now, these masterpieces? To what base uses have they been put? In what unrecognizable forms do their imperishable particles serve us to-day? Coined into money to liquidate the pay-rolls of the cohorts that destroyed them; cast into medals to commemorate the fall of the cities which they formerly ornamented, some of them to-day must be represented in the cabinets of European numismatists, side by side with other medals which record on their faces the actual appearance of the perished originals. That so vast a number of bronzes should have vanished is extraordinary enough, but this marvel must be multiplied a thousand-fold before it is possible to measure the loss that in this particular alone the greed and ambition of nations have inflicted on posterity; for when we trace the course of events we discover that the sculptured treasures of Grecian cities were destroyed, and the selected ones preserved, by the Romans under Mummius, Metellus and Sylla, and afterwards at Rome endured the fate that befell native Roman treasures; while those left in Greece first endured the assaults of Christian reformers and at a later date the attacks of the iconoclasts. Then, during the crusades, Baldwin, checked in his passage to the Holy Land, not only subdued Byzantium but overran parts of Greece, and his northern hordes are credited with destroying the Jupiter Olympus, the Juno of Samos, and the Minerva Parthenos, which had till then been preserved at Byzantium. Next, in 1312, the Spaniards attacked the Grecian empire, and not many years later had to yield on the same battle-fields to the victorious Venetians. In 1453, the Moslems under Mahomet II, had their innings and faithful in the interpretation of the Koran destroyed what sculptures could be found.[2] From that time onwards the constant struggles between Turks, Venetians and Greeks carried war and rapine into every part of the land that once felt the influence of Greek art, and as these constant struggles caused men to turn their thoughts more to arms than to intellectual pursuits the æsthetic senses of succeeding generations became more and more blunted, while the Greek of pure strain was either destroyed by the sword, or so polluted by inter-marriage with the military scum that succeeding devastators had left behind, that small wonder can be felt when the resulting mongrel shows so little regard for the works of those from whom he professes to claim descent as to feel that to make lime out of sculptured marble is a legitimate, a natural and a praiseworthy act. It is then a matter for gratitude that the earlier invaders removed some of the plastic treasures of Grecian art, and among them the Horses of St. Mark's, which were removed by the Venetians from the hippodrome at Byzantium after the fourth Crusade, in 1208, and for centuries have with stately grace been stepping off into space from their positions over the portico of St. Mark's.

They are notable works of art whoever wrought them, and their fame has for ages sounded through the world, so that there was every reason why Napoleon in 1797 should add them to the "bag" he attempted to make of all the art-treasures of Europe, with the object of making Paris the glory of the world in this particular as he intended it should be in every other. How these weighty animals were dismounted our illustration shows,[3] and another[3] shows them as forming part of a triumphal procession which is here shown entering the Champ de Mars on the 9th Thermidor, year VI of the Republic [July 27, 1798]. The inscription on the car that bore them was: "*Chevaux transportés de Corinth à Rome, et de Rome à Constantinople, et de Constantinople à Venise, et de Venise en France,*" and the further assurance: "*Ils sont enfin sur un terre libre.*" It has not been possible to discover where the horses were bestowed until they were hoisted to the top of the Arc du Carrousel, which was not built until 1806, and harnessed to a chariot of gilded lead, which was intended to bear the emperor in his coronation robes. In this place they remained for about ten years. But one of the things that early claimed the attention of the allies was to take steps for the return to their former resting places of the artistic spolia which the great conqueror had gathered, and so in 1815 the bronze horses of St. Mark were on their way back to Venice, stopping at Vienna on the way, and were soon hoisted to their present position. Of them Goethe, who does not boast a deep knowledge of the living animal, exclaims: "A glorious team of horses, — I should like to hear the opinion of a good judge of horse-flesh. What seemed strange to me was, that closely viewed, they appear heavy, while from the piazza below they look light as deer."



The Horses of St. Mark's.

And Samuel Rogers sings:

"In this temple porch
Old as he was, so near his hundredth year,
And blind — his eyes put out — did Dandolo
Stand forth, displaying on his crown the cross.
There did he stand, erect, invincible,
Though wan his cheeks, and wet with many tears,
For in his prayers he had been weeping much;
And now the pilgrim and the people wept
With admiration, saying in their hearts,
'Surely those aged limbs have need of rest!'
There did he stand, with his old armor on,
Ere gonfalon in hand, that streamed aloft,
As conscious of its glorious destiny,
So soon to float o'er mosque and minaret,
He sailed away, five hundred gallant ships,
Their lofty sides hung with emblazoned shields,
Following his track to fame. He went to die
But of his trophies four arrived ere long,
Snatched from destruction — the four steeds divine,
That strike the ground, resounding with their feet,
And from their nostrils snort ethereal flame
Over that very porch."

Another poet, "Owen Meredith," has found this a noteworthy incident and in elaborating it he makes use of a method that has been followed by many of his craft, both ancient and modern, and endows his beasts with speech.

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[1] Continued from No. 657, page 38.
[2] There were at one time in St. Sophia 426 statues.
[3] From "*Tableaux Historique de la Revolution,*" published in 1804.

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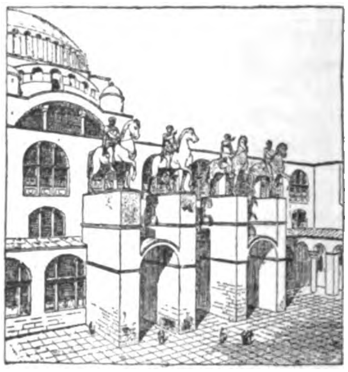
"At midnight, in the murtherous streets, the dew
Was blood-red, and the heavens were hurt with sounds
Of shriek and wail the ransacked region round.
So that men heard not, in the Hippodrome,
Those Four Bronze Horses, that had come from Rome,
In conference, talking each to each.
" One said:
'Our purple-mantled master, Power, is fled,
And how shall we four fare? Let us away
Thro' the thick night! For ever since the day
We followed that great Western Cæsar home
To grace the glories of Augustine Rome,
We four have felt no hand upon our manes
Less great than their's, who grasp the golden reins
Of Empire; they behind whose chariot wheel
Yet burning ruts their burning course reveal,
Who rode the rolling world. We also, when
Power pass'd from Rome, his car drew here again,
And carried Conquest in his course divine
From West to East, to dwell with Constantine.
But now is Power departed, who knows where?
Out of the East!'
" So spake that voice in air.
The others answered 'Whither shall we go?
Our master being gone? For who doth know
Where we may find him?'

XII.

" AND THE LION OF ST. MARK,

Listening in the dark,
To these replied the Lion of St. Mark.
'Power rideth on my wings. Come also ye
Whither I go, across the vassal sea.
And let us bear with us, to please him well,
Beauty, the spouse of Power. And we will dwell
Together.'
Then they answered 'Even so,
Lion! and where thou goest, we will go.'
So those Five Beasts went forth."[1]

been hoisted up and lowered down more than once to satisfy the whim or self-glorifying instincts of one potentate or another: from which it is plain that even in ancient times this famous quartet were held in highest honor. The chronicles of Scivos and Magno give the earliest information about them by recording that Augustus Cæsar brought them from Alexandria after his victory over Antony, and set them up on a triumphal arch at Rome; and used for this purpose once, succeeding emperors, Nero, Domitian, Trajan used them in turn to adorn other arches built in their own honor. At Rome, then, they remained for some three hundred years, harnessed now to one form of triumphal chariot and now to another, until Constantine decided to transfer the capital of his mighty empire to a new seat, and not unnaturally packed up these much-prized horses with the other works of art with which he proposed to adorn his new city on the Thracian Bosphorus.



Suggestion as to Treatment of the Exonarthex of St. Sophia's.

The pedigree of these steeds of noble strain is, then, of the longest and it lacks only a few centuries of being complete — from the time of their probable founding in the workshop of Lysippus, about 350 B.C., to the death of Antony, 30 B.C. By what route they reached Alexandria, by sea direct or overland by Asia Minor and Syria, is open to conjecture. Perhaps as

French Troops removing the Bronze Horses from St. Mark's, Venice, in 1797.[2]

Antony met Cleopatra in Cilicia and there succumbed to her charms, he may, if the group was a love-token, have scoured the neighboring country for its choicest treasure and may have found these already travelled statues in some neighboring town; or he may have sent agents to Corinth to secure them, for Corinth is by some believed to have been their original home. At any rate, the beholder may please his fancy as he will by constructing an itinerary which will only add to their renown as horses who have covered only less space than those driven by the sun-god.

These horses are commonly believed to have been taken from the hippodrome at Byzantium, but they may have occupied a somewhat similar position to that they now hold, for the accompanying sketch by Viollet-le-Duc, with which he illustrates his suggestion as to the possible treatment of the exonarthex of St. Sophia, suggests that the horses of St. Mark's may once have held guard, even if riderless, over the entrance to some pagan temple or basilica of the Eastern church.

But though it is quite commonly known that they came from Byzantium to Venice, it is not so generally known that these much-travelled steeds had visited Italy before, and had

Apart from their artistic value, aside from their history, these horses are singular in one other particular. Horses modelled in the round are not infrequently adjuncts of architectural

[1] From Owen Meredith's (Robert, Lord Lytton), "*Siege of Constantinople.*"

[2] From "*Tableaux Historiques de la Revolution Française.*"

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decoration, so their position over the doorway of St. Mark's does not especially attract the attention, but they are amongst equestrian statues unique in the character of their support. In his "*Brick and Marble in the Middle Ages*," George Edmond Street says: "I never leave St. Mark's without taking one look at least at the four bronze horses, which, placed as they are on columns high above the ground, add so much to the strange character of the west front, and are in themselves such exquisite examples of their kind. Strange ornaments these for the façade of the chief church of a city where horse's feet have hardly ever trod! Equally strange, if you are to have horses in such a position at all, is the way in which these are supported. They stand balancing themselves nicely on the caps of small columns. Extremes meet; and I am not so sure but that this extraordinary arrangement is not better than that which is usually adopted. If horses are to be supported above the ground, they may almost as well be so in this way as on the ordinary pedestal, which looks equally unsafe if the bronze is instinct with life."

Mr. Street seems not to have known that in spite of their insular position the Venetians were great lovers of horses and bred them — on the mainland — in great numbers, probably brought to this necessity by their being so frequently embroiled in Renaissance times with the neighboring powers in the north of Italy. The fame of Venetian horsemen was such that they were employed in numbers in the hippodrome of Constantinople, and during the famous factional troubles that had their seat of action in the hippodrome these Venetians gave their name to one of the factions. At any rate, the Venetians held these horses in special veneration and this fact was known to all men, and when in 1379 the Genoese fleet under Pietro Doria was besieging Venice and the city found itself in more desperate strait than ever before and sued for peace on any terms, he could think of no more fitting taunt with which to couple his rejection of their overture than to declare that he would not make peace till with his own hands he had bridled the bronze horses of St. Mark's. But fortune turned against him, and city and horses were spared this ignominy.

[To be continued.]

BUILDERS' HARDWARE.[1] — II.

METALS AND VARIETIES OF FINISH.

From *La Semaine des Constructeurs.*

BEFORE beginning a study of any portion of the subject, an attempt will be made to consider the metals used for builders' hardware and the various styles of finish possible in connection with them.

Iron is naturally the first material thought of. In its purest form it is known as wrought-iron, a term which is derived from the fact that in the earliest processes the iron was beaten while hot and the impurities forced out by the blows. Also the name indicates, to an extent, the nature of the material, which is yielding and pliable rather than brittle or hard. Wrought-iron is the most available material for constructive metal-work. Nails, bolts, ties, anchors, etc., are more naturally made of wrought-iron than of any other material. Nearly all strap-hinges and the best makes of common butts are made of it; also, for some forms of common bolts and any article of hardware which permits the metal being punched or pressed into shape, wrought-iron is more suitable than cast, and is much used on account of its superior strength. For finished work, such as knobs, plates, etc., there is very little wrought-iron hardware in the market. A good deal of it is made to order in the shape of ornamental hinges, straps and braces, but the amount of work involved in producing any given pattern is so largely in excess of what the same amount of work would produce in other metals that wrought-iron will always be a material for the artist or the amateur. Quite recently, however, there has been made an important discovery which bids fair to bring about a change in the use of this metal. Wrought-iron melts at a very high temperature and it has, therefore, long been practically impossible to cast it in fine moulds; but by the addition of a small percentage of aluminium to wrought-iron when in a highly-heated condition an alloy is formed which melts at a greatly reduced temperature and gives the metal the degree of fluidity necessary to successful casting. It is claimed that the wrought-iron castings obtained in this way have all the sharpness and clearness of cast brass and at the same time retain the structural qualities of wrought-iron. So far as we can ascertain, cast wrought-iron is not in the market.

When wrought-iron has mixed with it a proportion of carbon exceeding 0.5% but not greater than 2% the structural nature of the metal is entirely changed and it becomes known as steel. So far as relates to finished hardware, steel is used only for springs and portions of detail, as the metal does not cast readily, and the surface will not keep bright. In fact, there are the same objections to it that there are to wrought-iron and almost the only use to which it is now put in hardware is in the manufacture of nails and screws and some brands of butts, which will be described later on.

When iron contains in its composition over 2% of carbon it becomes known as cast-iron, a metal which melts at a comparatively low temperature and is capable of being cast with very sharp lines. It is used a great deal for finishing work, though from its brittle nature and lack of tensile strength it is not utilized to any great extent for constructive purposes.

Iron hardware is finished in a variety of ways. If left in its natural condition as it comes from the file or hammer, it will rust very speedily, and to prevent this, the most common method is to heat the iron and paint it while hot with linseed oil, colored with lamp-black and mixed with a quantity of dryer or turpentine. When this coating is dry, the iron is sometimes roasted in a kiln — fired, as it is termed. In this manner the paint seems to be dried into the pores of the metal, and it is left with a smooth, lustreless black surface, capable of resisting the action of the weather for quite a while, though by no means rust-proof.

If, instead of the foregoing, a bath is used composed of linseed oil and gum-anime or copal, the iron, on being finally fired and polished, presents the appearance of bronze. The tones can be varied to a considerable extent by the addition of color in the shape of powdered alloys of copper and bronze, which are mixed with the oil. The "Tucker bronze," the "Berlin bronze," and the so-called "Boston finish" are all substantially of this nature. Only rarely is a thin film of bronze or composition spread on the iron by the aid of electrolysis. All of the bronze-faced iron hardware is treated with the hot-oil finish just described. The cheapest forms of iron hardware are japanned or even merely coated with ordinary black varnish, the quality of the japanning or varnish depending upon the grade of goods. Japanning is practically indestructible where the iron is not exposed to scratches or rubbing. Hinges and butts are finished in this way more than any other one form of iron-hardware, though of late years the best machine lock makers have taken a great deal of care in japanning the outer casings of locks. Fine grades of pulleys are also sometimes sold with japanned frames.

Iron is galvanized by simply immersing in a bath of a melted amalgam of zinc and mercury, containing a little sodium. The iron is first cleaned with sulphuric acid, and before immersion in the bath, it is usually dusted with sal-ammoniac powder. There is not a particle of real galvanic action about the process. It is sometimes thought that the zinc and mercury form a species of alloy with the iron which prevents it from rusting. Galvanizing is, indeed, the best preservative of iron applied in the form of a wash, but the color is not sufficiently pleasing to permit of its being used for nice work.

None of the foregoing processes are especially suitable for iron, as they all effectually disguise the nature of the material. There has recently been invented a process for protecting iron from rust, which is in some respects the best thus far devised. It is known as the Bower-Barff process, a term used to indicate two processes by which the surface of the metal is converted into magnetic oxide of iron, in which condition it is absolutely rustless. In the Barff process the metal is simply subjected to the action of superheated steam. This process is peculiarly

[1] Continued from No. 657, page 39.

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suitable to wrought-iron and highly finished work. In the Bower process the iron is successively subjected to the action of highly heated air and carbonic-oxide gas. The heat converts the surface of the metal first into red oxide of iron, which is finally reduced to the magnetic oxide by the action of the gas. Owing to the simplicity of the process, it is claimed that its cost is less than that of galvanizing. It may be applied to any kind or style of wrought or cast iron or steel. The surfaces so treated have a perfectly uniform blue-black color. The sharpness of the lines is not affected in the least, and when the work is polished the final color is a lustrous ebony black, such as can be obtained in no other way. This coating of magnetic oxide is so hard that it is removed with difficulty by an emery-wheel. A few of the leading dealers are beginning to keep in stock some fine grades of door hardware finished by the Bower-Barff process, but the only parties making use of the patents in the production of builder's hardware are the Yale & Towne Manufacturing Co. This concern is beginning to put in the market quite an extended line of Bower-Barff iron goods.

Iron hardware is also found in the market finished with copper-plating, the raised surface of the pattern being buffed to show the natural copper color, while the background is left black or strongly oxydized. There is quite a variety of goods in this line. Similarly ironwork is nickel-plated, being left with either plain polished surfaces or with polished raised patterns on a black ground. Both nickel and copper plating, are laid on with the aid of a dynamo.

Brass and bronze are terms which are often confounded when speaking of hardware, though the materials are quite different in composition and are usually dissimilar in appearance. Brass is an alloy of copper and zinc in varying proportions, the ratio for ordinary purposes being seven of brass to three of zinc. Brass has a light yellowish appearance, is susceptible of a high polish, and can be rendered more ductile by the admixture of a small quantity of lead, which at the same time will diminish the hardness of the alloy. Brass tarnishes very easily if handled or exposed to the weather, and is consequently generally protected by a coating of shellac, which, however, will not entirely prevent it from changing in tone. The color of the brass may be altered slightly by changing the proportions of the metals entering into the alloy, also by treating the finished castings with acids or hot chemicals in the same manner as will be described later for bronze.

Bronze is commonly an alloy of copper and tin in proportions varying from twelve parts copper to one part tin for metals to be used in the fabrication of mathematical instruments, to two parts copper and one part tin, for telescope or speculum metal. Bronze is sometimes more complex in its nature, lead being added in very slight quantity, and aluminium sometimes replacing the tin. It is less malleable but harder and more fusible than brass, and can be cast with greater ease and perfection. It is oxidized more easily than brass, and because of this it is possible to obtain a greater variety of colors for hardware goods.

Both brass and bronze can be cast with great ease, as compared with iron. The sharpness and delicacy of the casting depends, of course, entirely upon the care bestowed in preparing the pattern and the mould. There is a great difference in the quality of the work turned out by the various manufacturers. In the best of work the mould is formed with very fine sand and is double-faced, that is to say, after the pattern has been imprinted in the sand it is withdrawn, the matrix sprinkled with a still finer sand, and the mould repacked. After that, the moulds are suspended in the fumes of burning rosin, by which means they are coated with a fine layer of impalpable soot. When the molten metal is poured into the mould, the soot is pressed evenly into all the minute pores or interstices of the sand, and the resulting casting is so smooth and sharp as often to require but very little hand-chasing.

Brass goods are usually finished in the natural color of the metal with a thin coat of shellac. The same proportions of tin and copper are usually used for all the bronze work of a single firm, though the different manufacturers do not always adopt the same alloy. Bronze is, however, finished in a great variety of styles and colors, all produced essentially as follows:

The bronze on leaving the casting-room, is trimmed or chased as may be necessary, and is then immersed for a few moments in a strong acid bath which takes an almost infinitessimal film from the metal, leaving the surfaces entirely free from any oxidations or impurities. The piece of metal is then washed in weak alkali and clear water, to make it perfectly clean. Then the bronze is suspended in a bath of hot acids specially prepared with various chemicals to produce certain changes in the color of the metal. This operation is a very delicate one, requiring the care of trained workmen and a nice appreciation of the proper time to stop the action of the acids, as the appearance of the metal changes very rapidly, turning first from a bright copper red, to a pale gray and then into beautiful shades of browns and rich purples with ultimate dark tones depending upon the composition of the mixture or pickle. When the desired shade is reached the bronze is removed, dried in saw-dust, and rubbed down to an even tone on a buffing-wheel. In some designs the raised portions are buffed down until the natural color of the metal appears, the pattern showing on a ground of the darker oxidized tone. Almost any color or shade can be had with bronze by a proper treatment. The Hopkins & Dickinson Manufacturing Co. has even produced a bronze as dark as iron, and in fact quite similar in appearance. Of course ordinary hardware is simply left the natural color of the metal, when made in plain bronze. It may be said here that plain bronze is as a rule more expensive than figured work. The plain surfaces require a very even grade of metal and smoothness of casting, whereas any imperfections are hidden by patterns, and a cheaper quality of workmanship does not expose itself. In the East there seems to be a decided preference for the plain goods, while in the West the figured styles are more commonly used. When exposed to rough usage a patterned piece of hardware will in general show wear less than a plain surface.

It must be remembered that the surface finishes produced in the manner just described are not to be described as permanent. The color is in reality laid on, and is superior to paint or varnish only in that by the means of the hot pickle the color penetrates somewhat deeper than if put on with a brush. Bronze hardware is sure to change in time, no matter how it may be finished, and generally the stronger tones are the least satisfactory in the end, fading out to unpleasant musty hues. Shellac will hold the color, but as soon as it wears off, which it is sure to do on such pieces as knobs and door-handles, the exposed surfaces will turn while the shellacked spots do not. When time can be spared to keep the work polished brightly, a better plan seems to us to be to avoid everything but the natural bronze or brass color, omit the shellac, and polish by hand constantly. This, however, is seldom desirable. We have not yet reached the point where housekeepers will take as much care of the hardware as of the silver.

The treatment of silver-plated bronze is of a similar nature. The knob or plate is immersed in a silver-plating bath attached to an electric dynamo. A very few moments suffice for the deposition of the silver. The article is then taken from the bath and treated with hot acids and solutions until any desired degree of oxidation is obtained, when it is dried in saw-dust and the raised patterns slightly brightened on a buffing-wheel. There is at present a great deal of oxidized silver hardware in the market. Most of it is oxidized but slightly, leaving the raised figures a clear frosty white, but it can be had quite black if desired. The Yale & Towne Manufacturing Co., has an oxidized silver finish which is as black as old oxidized gun-metal.

Several very pleasing styles of finish are obtained by electro-plating the bronze with copper and then treating with acids. An old-copper color thus obtained is one of the most durable finishes in the market.

When the cost is not a consideration it is sometimes desirable to have gold-plated bronze hardware, especially for such things as knobs, which are exposed to constant handling. Gold-plate is no handsomer than some shades of natural bronze, but the gold will not tarnish or be influenced by the weather. Gold-plating increases the cost of bronze hardware nearly twenty fold, and being so expensive is executed only for special orders.

Nickel-plating is applied more commonly to iron or steel than to bronze. This finish is but little used for nice work as the nickel will tarnish by exposure to the atmosphere after which no amount of rubbing will restore its first appearance. Nickel-plating is best adapted for keys, springs, etc.

The following list will give an idea of the great variety of possible treatments of bronze hardware.

FINISHES FOR BRONZE HARDWARE.

I. *The Hopkins & Dickinson M'f'g Co., finish:* —

A. Statuary. Dark background, light surface.
B. Statuary. Medium dark background and surface.

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E. Ebony. Suitable only for Plain or Lined Design.
F. Statuary. Matted with Green.
G. Gilt or Gold-washed.
H. Gold-plated.
I. Gold-plated. Matted with Enamel, in all colors.
K. Gold-plated. Matted with Silver.
L. Silver-plated.
M. Silver-plated. Matted with Gold.
N. Nickel-plated.
O. Nickel-plated. Matted with Enamel.
P. Nickel-plated. Matted with Gold.
R. Nickel-plated. Matted with Copper.
S. Hand-plated. Silver, suitable only for perfectly plain patterns.

II. *P. & F. Corbin, finish:* —

No. 1. Natural Color, Light Bronze.
No. 2. Chemical Dark Brown or Statuary Bronze.
No. 3. Natural Color on Surface and Black Background.
No. 3½. Same as No. 3 Finish, with different arrangement of colors.
No. 4. Natural Color on Surface and Dark Brown Background.
No. 5. Nickel-plated.
No. 7. Nickel-plated Surface with Gold-plated Background.
No. 8. Gold-plated.
No. 10. High Polish, Natural Color.
No. 15. Sage Green Background and Natural Color on Surface.
No. 16. Terra-cotta Background and Natural Color on Surface.
No. 17. Steel Gray Background and Natural Color on Surface.
No. 18. Japanese Finish.
No. 19. Oxidized-silver Finish.
No. 20. Old Brass Finish.
No. 21. Oxidized-Iron Finish.
No. 22. Antique-Copper Finish.

III. *The Ireland M'f'g Co., finish:* —

No. 1. Light Bronze.
No. 2. Light Brown.
No. 3. Black Background, Polished Surface.
No. 4. Brown Background, Polished Surface.
No. 5. Nickel-plated Surface and Background.
No. 15. Sage Green Background, Polished Surface.
No. 16. Terra-cotta Background, Polished Surface.
No. 17. Steel Gray Background, Polished Surface.
No. 19. Oxidized-silver.
No. 21. Iron Finish all over.

IV. *Nimick & Brittan, finish:* —

No. 1. Bright Surface, Natural Color.
No. 2. Dark Brown Surface and Background.
No. 3. Bright Surface and Black Background.
No. 4. Bright Surface and Brown Background.
No. 5. Bright Surface and Terra-Cotta Background.
No. 6. Bright Surface and Green Background.
No. 7. Nickel-plated Surface and Background.
No. 8. Nickel-plated Surface and Black Background.
No. 12. Gold-plated.
No. 13. Steel Gray Bronze.
No. 14. Old Gold Bronze.
No. 15. Oxidized-silver Surface and Background.

V. *Nashua Lock Co., finish:* —

No. 1. Natural Color, Light Bronze, Polished Surface.
No. 2. Dark Bronze.
No. 3. Light Bronze, Polished Surface, with Black Background.
No. 4. Light Bronze, Polished Surface, with Brown Background.
No. 5. Nickel-plated, Plain Surface.
No. 6. Nickel-plated Surface, with Black Background.
No. 15. Hand Finish.

Besides the finished work, both brass and bronze are used for screws, springs, lock-fittings, etc. A few locks are made with cases of cast-brass and some manufacturers are preparing to use copper-plated iron ore for the same purpose.

Brass and bronze together are used more than any other one metal for builders' hardware and are the basis of nearly all door and window fittings.

An important addition to the list of metals available for hardware purposes has recently been made in the shape of a composition designated as Phosphor-Bronze, an alloy of which the constituent parts are not as yet made public, but which the patentees describe as being a phosphorized alloy of copper and tin. The chemical action of phosphorous on the metals composing the alloys is claimed to be two-fold; on the one hand it reduced any oxides dissolved therein, and on the other it forms with the purified metals a most homogenous and regular combination, the hardness, strength, and toughness of which are completely under control. No other metal combines, in so high a degree as phosphor-bronze, the conditions of toughness, rigidity, hardness and great elastic resistance. Thus far phosphor-bronze has been used in the hardware trade only for screws and for lock-springs. In cities wherein soft coal is used, it has been found that brass springs soon lose their elasticity, owing to the action of free sulphuric acid in the air. Careful tests have shown that phosphor-bronze offers twice as much resistance to corrosion by acid as copper. Further experiments have been made, extending over a period of ten months, to determine its durability, when exposed to the weather, as compared with the best brass wire. After lying on the damp ground for that length of time the brass was found to be quite brittle and worthless, while the phosphor-bronze, under exactly similar conditions was practically unchanged. It will be readily seen then how valuable a metal this is. Unfortunately its degree of elasticity is less than that of brass, and the springs required for a lock when of phosphor-bronze are sometimes so large as to be impracticable. It is, however, by all odds the best material for springs and is used by the Hopkins & Dickinson Manufacturing Co. in their best grades of locks.

Aluminium has recently appeared as a possible substitute for bronze. It is a metal not unlike lead or platinum in appearance, but is very light, having a specific gravity of 2.56, equal to about one-third that of steel and one-fourth that of silver.

It is very strong, will not tarnish, and is almost indestructible. It melts at a comparatively low temperature and can be cast with sharp lines. Copper, brass, and bronze are improved in strength, color, and durability by the addition of ten per cent of aluminium. It is, however, a metal of the future and is not yet in the hardware market.

The Illustrations

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

HOUSE OF JOHN E. THAYER, ESQ., LANCASTER, MASS. MESSRS. STURGIS & BRIGHAM, ARCHITECTS, BOSTON, MASS.

[Gelatine print, issued only with the Imperial Edition.]

THE ARCH OF THE PLACE DU CARROUSEL, PARIS, FRANCE. M. PERCIER, ARCHITECT.

See article on "Equestrian Monuments," elsewhere in this issue.

THE HORSES OF ST. MARK'S, DEFILING ON THE CHAMP DE MARS, PARIS, FRANCE.

See article on "Equestrian Monuments."

THE PORTICO OF ST. MARK'S, VENICE, ITALY.

This view which is reproduced from a very excellent print in the *Builder* shows the bronze horses from an unusually favorable point of view.

SKETCHES FROM THE OLD BROOKS HOUSE, MEDFORD, MASS.

GATE-LODGE FOR E. H. JOHNSON, ESQ., ALTA CREST, GREENWICH, CONN. MESSRS. CARRERE & HASTINGS, ARCHITECTS, NEW YORK, N. Y.

This lodge, or farmer's cottage, which is built of pasture-stone and wood, will cost, including heating apparatus and plumbing, $1,800.

HOUSE FOR J. S. BETTS, ESQ., DENVER, COLO. MESSRS. ANDREWS & JAQUES, ARCHITECTS, BOSTON, MASS.

DINING-ROOM AND RECEPTION-ROOM IN HOUSE OF L. M. HORNTHAL, ESQ., NEW YORK, N. Y. MESSRS. A. ZUCKER & CO., ARCHITECTS, NEW YORK, N. Y.

Milan Cathedral. — Apropos of the final architectural competition for the Cathedral of Milan, Mr. Paul Cesa Bianchi, the architect of the Cathedral, has been delivering an address at Milan on the origin of the Cathedral. As to the much disputed question of the active part taken in its building by Jean Galeas Visconti, Count of Vertu, Mr. Bianchi declared himself a strong partisan of Visconti, and devoted the first part of his address to the consideration of the foreign influences to which the great monument had been subjected. In the second part the lecturer spoke of the native and brought out in a most interesting way the influence of Tuscan art in the work. As in the first part he attached particular importance to the personality of Antoine de Saluce, the archbishop who was prominent for the part he took in the development of the construction of the monument, so in the second he emphasized that of John of Milan, who worked on the Cathedral after having been the pupil and friend of Gaddi at Florence, and having there executed some remarkable works. An Italian writer on art, Alfredo Melani, in a recent correspondence thinks that the Tuscan influence so highly praised by Mr. Bianchi should not be allowed to count for too much. He also points out the impossibility of the identity of André degli Organi, the actual author of the Cathedral, or the person who first proposed its construction and elaborated his idea, with the celebrated Florentine architect, Andrea Orcagna, a nidentity that Mr. Bianchi undertook to prove. The mere fact that Orcagna died in 1368, and that the work of building the Cathedral of Milan was only commenced twenty years later, is sufficient to show that Mr. Bianchi allowed his enthusiasm for Tuscan art to carry him too far. "However that may be," says Mr. Melani, "it is to be hoped that the address may be published, for the resources it contains widen the field in which up to this time have been concentrated the labors of all those interested in the cathedral."

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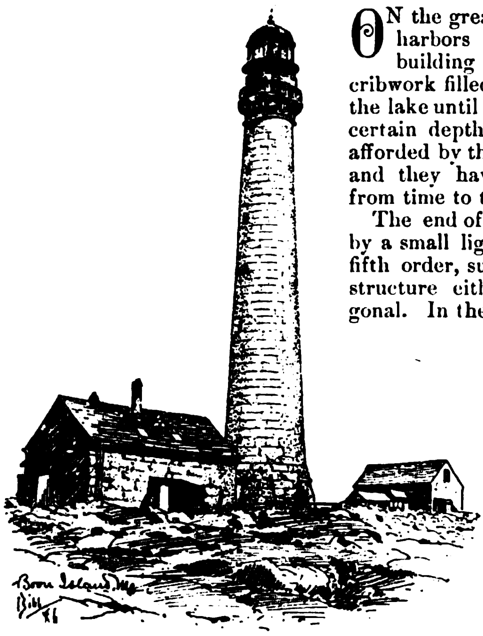
ANCIENT AND MODERN LIGHT-HOUSES.[1]—XXII.

PIER-HEAD LIGHTS.



ON the great lakes most of the harbors are improved by building two parallel piers of cribwork filled with stone out into the lake until these piers reach a certain depth of water; the relief afforded by them is but temporary and they have to be extended from time to time.

The end of one pier is marked by a small light of the fourth or fifth order, supported on a frame structure either square or polygonal. In the tower there is room for the spare lamps, supply of oil, etc., and a place for the keeper to sleep. When the pier is extended these towers can be readily moved out to the end. The story that they are so light that a schooner ran her bowspirit through one and carried it from Grand Haven to Chicago is current but not trustworthy.

When the pier is entirely completed, the practice is to build a separate foundation and to place on it a conical cast-iron tower similar to the one at the entrance to Portsmouth Harbor, N. H.

Quite a pretty light of the kind, but modelled after a small Roman temple, is on the end of the Portland, Maine, Breakwater.

RIVER-LIGHTS.

The total number of lighted aids to navigation in the United States on the 1st of July, 1887, including light-ships and lighted buoys was 2034, of these 1232 are what is known as river-lights.

Congress has specially authorized the following rivers to be lighted: Hudson and East Rivers, N. Y.; Delaware River between Philadelphia, Pa., and Bordentown, N. J.; Elk River, Md.; Cape Fear River, N. C.; Savannah River, Ga.; St. John's River, Fla.; Mouth of Red River, La.; Chicot Pass and navigable channel along Grand Lake, La.; Mississippi, Missouri, Ohio, Tennessee and Great Kanawha Rivers; Columbia and Willamette Rivers, Oregon; and Puget Sound, Washington Territory.

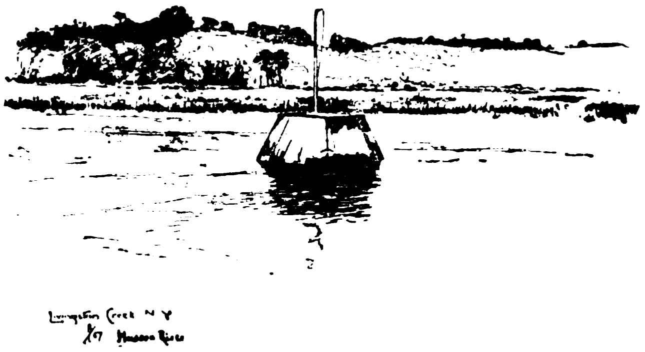
A river-light is an exceedingly simple affair, consisting of a pole or mast with an arm or a shelf at its top by which to support a lantern. These are generally placed on the shore, but sometimes the light is needed in mid-stream in which case a small crib filled with stone forms a base for the pole. Or, sometimes, an iron spindle is inserted in the rock as is the case in several places on the East River, N. Y.

The lanterns in general use are known as tubular lens lanterns, they are not liable to be blown out and will burn all night.

There are many places difficult and dangerous of access in stormy weather where small lights would be of great value could they be constantly maintained, this has been accomplished by a simple addition to the lens lantern of a reservoir containing a gallon of oil, which is automatically fed to the lamp on the principle of the German student-lamp. By this device the lamp will burn and give a good light for at least eight days and nights without attention and during this time there is almost sure to be weather calm enough for the keeper to attend to the light. This improvement was made at the Light-House Depot at Staten Island; it is of recent date and already promises to extend the use of the stake-lights to places where formerly it was thought necessary to establish regular light-houses.

One of the simplest towers in the Light-House service existed for many years at Edenton, N. C. As the sketch shows it was a tree, whose branches supported a box for the lantern and a platform reached by a ladder.

I regret to say that this picturesque structure perished through

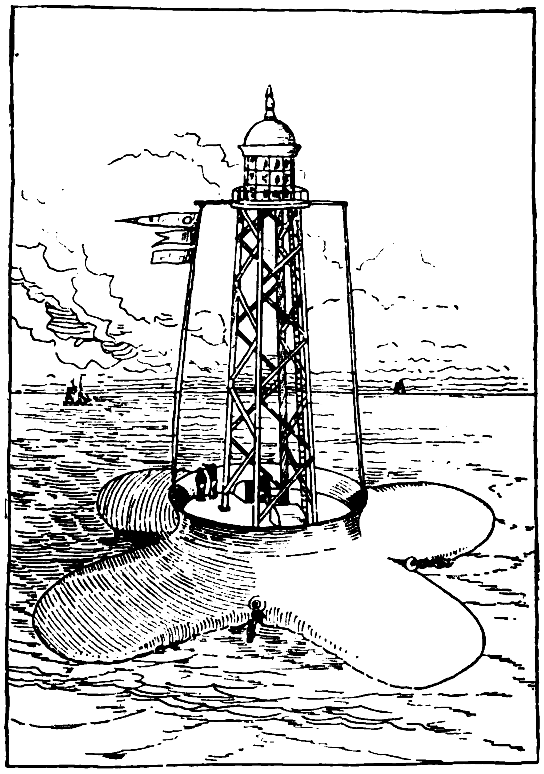


old age and was replaced by a prosaic pole to the top of which the lantern was nightly hauled by a rope.

As soon as the energetic citizens of the neighborhood discovered that the light-keeper was no longer condemned to the exertion of climbing a ladder night and morning, the Light-House Board received a number of applications for his position.

FLOATING-LIGHTS.

Floating-lights are of two kinds, light-ships and lighted-buoys. The former are very strongly built schooners, which show during the day a colored disk from each mast to distinguish them from ordinary vessels, while at night powerful lights are hoisted to their tops:



Captain Moody's Floating Light-house.

these lights consist of eight or nine lamps with reflectors hung on gimbals so that their rays will be projected horizontally. They are arranged in a circle and enclosed in a lantern; during the day the whole apparatus is lowered to the deck into a small house at the foot of each mast. Light-vessels are also provided with a fog-bell and sometimes with a fog-whistle operated by steam; they are stationed on outlying shoals where it is difficult if not impossible to erect light-houses. There are twenty-three of these light-vessels in position on the Atlantic Coast and one on Lake St. Clair: there are none on the Pacific Coast.

As light-ships are occasionally driven from their moorings by severe storms or may in some way be disabled, relief light-ships are kept in readiness to replace them until they can be returned to their stations.

Lighted buoys are comparatively of recent invention, they consist of a buoy filled with compressed illuminating gas; on the top of the buoy is a gas-jet in a lens, the latter is so arranged that neither wind

[1] Continued from No. 646, page 221.

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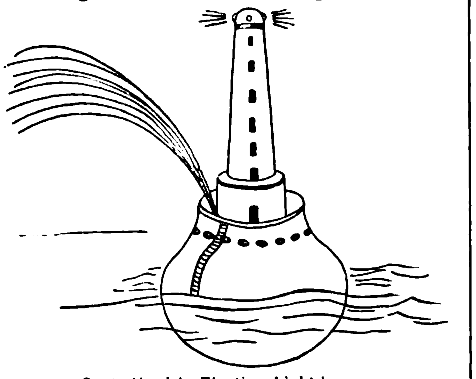
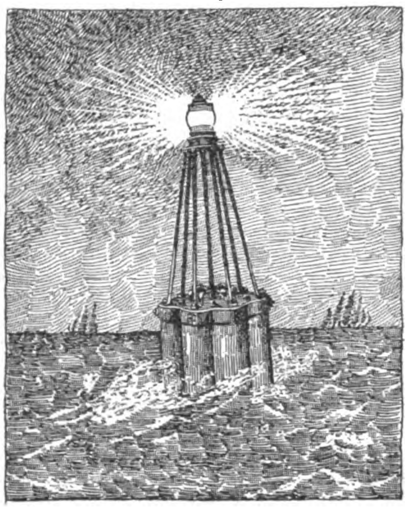
nor wave can extinguish the light, while an ingenious governor determines a constant flow of gas to the burner irrespective of the pressure in the buoy. When lighted they will burn for a long time without attention, generally about three months, though this length of time may be altered by changing the size of the buoy and the pressure to which the gas is subjected.


Capt. Harris's Floating Light-house.

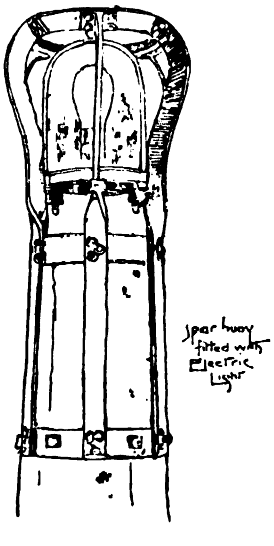
This system of lighting by compressed gas is, of course, also applicable to stationary lights and is used in the beacons in Currituck Sound, N. C., and also on the Romer Shoal, New York Harbor. Another kind of lighted buoy has just passed successfully its experimental stage and is now being actively pushed to completion as a practical aid to mariners. It is the joint invention of Lt. Comdr. M. R. S. Mackenzie, U. S. N., and Lieut. John Millis, Corps of Engineers, U. S. A., and in general terms consists of a spar-buoy supporting an incandescent electric-light connected to a dynamo-machine on shore by an armored cable.


Foster's Gas-lighted Buoy.

The incandescent lamp is enclosed in a cylinder of stout glass to protect it from the waves, and this cylinder is further protected against the shocks of ice or other floating bodies by a kind of cage of steel bars.

Six of these buoys, three on each side, will be set to mark Gedney's Channel, New York Bay: the house containing the engine, boiler and dynamos will be located at Sandy Hook; the whole work is now under contract and will probably be in operation by the fall.

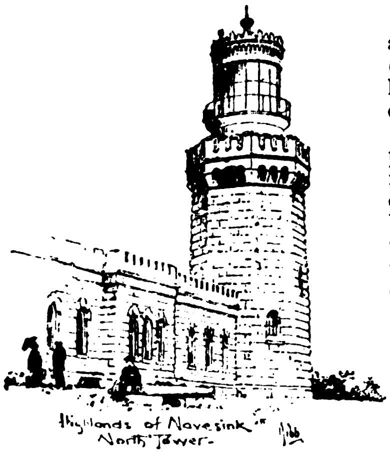
It has been frequently suggested that, that portion of the Atlantic Ocean most frequented by vessels should be lighted by a series of floating light-houses. At our Centennial Exhibition at Philadelphia several drawings and paintings were shown exhibiting the methods by means of which it was proposed to accomplish this object.



The following are some of the advantages claimed by the inventors: the light-houses could be anchored anywhere on the high seas and both guide and light vessels to their destination (one inventor showed his light-houses strung across the ocean like street-lamps in a city); they could be used as post-offices, telegraph, signal and life-saving stations. Pilots would await on them the arrivals of vessels; in stormy weather ships could moor to them and outride the gale. Captain Harris's painting, quite a large one, showed three floating light-houses and several vessels in a violent storm, the latter are much tossed but the light-houses are steady and are assisting the vessels by firing rockets and throwing life-lines from mortars. The supports of the light-houses are apparently can-buoys of large size. Captain John Moody's float is also of wrought-iron and shows considerable originality. It has four immense rays or arms, these being intended primarily to steady it and could also be used for storage purposes; the Captain claims that its peculiar form allows it to be boarded at any time and in any weather and that in time of war it could be used as a fort.

It is needless to say that none of these projects have been put into effect, perhaps the reason may be found in a remark by one of the inventors: "The undertaking is certainly great, and to carry it out in a series of vessels across the Atlantic would cost a great sum of money."

FINDING WATER BY THE DIVINING-ROD.



WITH reference to the paper on "Modern Divinations," which appeared in this *Journal* (February 18, 1888), we have received the following communications:

You may perhaps be surprised to hear that there are numbers of intelligent readers of your *Journal* that believe implicitly in the "dowsing rod" for finding water, and that those readers include noblemen, gentlemen, parsons, bishops, officers of the army, engineers, magistrates and others. The chief "water-wizards" at present are John Mullens and Lawrence; and the first can, I know, furnish a volume of testimonials to his powers from parties such as I have named. John Mullens has operated in very many places in England, and as far north as Dundee and other places in Scotland. He belongs to the same county as Lawrence, is a working mason on a gentleman's estate, and an unpretending honest man, who, if desired, sinks and builds his own wells, and charges nothing if the water is not found. He prefers to be employed after long droughts, as water found then, he reasonably concludes, will generally be from a permanent source. In wet seasons, he says, "there is water everywhere," and the good springs are consequently worse to find. He has been employed here several times to find water, after much expense had been incurred with engineers and others, and has always been successful, although at first most of us doubted his powers. I have tested him in every possible way, and he has never failed. No one now hereabouts doubts his powers. The vicar was perhaps the most incredulous until he had tested the man thoroughly, what convinced

him most being that when Mullens was asked to find water in his flower garden, he set out accurately the running sewer from the house for a long distance — not a trace of which was discernible above ground, and which no one knew but the vicar. He did other work of the same kind at the mansion here, finding an old disused sewer, the existence of which was suspected, but, although searched for could not be found.

He has been employed, I believe, on similar duties by the London authorities. He discovered our water-mains and branches here wherever he crossed them in the course of his journeys, greatly to the surprise of an engineer from Sheffield who constructed our reservoirs, and who followed John "afar off" for several days. The same engineer afterwards confessed to the writer that he was puzzled; but he admitted the man's powers. Mullens used the hazel and thorn "twig" only. No member of his family has the "gift," hence everything has to be done by himself. He asks no assistance save a "twig," cut close by, and a lad to follow behind and put a peg in where he makes a mark with his heel. He charges his fare and a modest fee, and is willing to submit to any reasonable test. He does not profess to explain his power, knows little or nothing about science, and is rather illiterate. Not a few large breweries and manufactories owe their water-supply to him. He does not profess to find still water; it must be *running*. In the case of the water-mains here, the "twig" turned up above the pipe in fields, woods, and

highways where no signs of the ground having been disturbed appeared, the pipes having been long down, and no one knowing anything about their whereabouts but the waterman, and he depends on the map when he seeks them.

I do not attribute the man's gift to anything supernatural, but to natural causes not yet understood. That water can be found by the man in the way described, I have no doubt whatever; and I am equally sure he will confound any sceptic who tries him. Mullens says a "twig" from a variety of trees will do, but the hawthorn and hazel are the most active; and the way the point whirls round in a moment above water is marvellous. The "twig" is Y-shaped; and the man, holding a leg firmly in each hand and the point downwards, steps slowly forward, stooping. On one occasion I held one end of the "twig," where it projected through his hand, the vicar holding the other end, both firmly, Mullens simply holding it, but without the power to move it up or down, yet it whirled round as before, except where we held it, and consequently *twisted* the bark into wrinkles by the force it exercised.

Another correspondent writes: My attention having been drawn to your article upon the use of the divining-rod in finding water, I beg to give you my experience upon the matter. About four years ago I was invited by a land-agent in a neighboring parish to meet him and a man whom he had sent for from the neighborhood of Bristol, who, he stated could find water with a divining-rod. At first I decided I would not go on such a wild-goose chase, as I thought it would turn out; but afterwards I changed my mind and went to meet them. The rod consisted of a small branch of white thorn about eighteen inches long in the shape of the letter Y. When the man — who was a mason — tried to find water, he walked slowly over the ground clasping the rod firmly with both hands near to the forked branches; and when the branches moved upwards he said there was a spring of water below, and gave his opinion as to the depth of it from the surface. I was sceptical about the rod, and thought he moved it by some sleight-of-hand; but in the course of the day I was convinced it was not so. We afterwards came to a small stream of water by the side of a road caused by a heavy shower of rain. I asked the man to test it. I took hold of the rod as well as himself, in order to prevent the stick from twisting about; but in crossing the water I could not stop it doing so. I then held it with a pair of pincers, which had the desired effect as regarded that portion of the rod, but not so with the forked branches; in twisting upwards, each branch was split in the middle of them.

I engaged the mason to look over an estate of which I had the management, and some portion of which was short of water. I took him to some deep wells of which I knew the depth. He was able to tell me the depth within a few feet. We next proceeded to a farmyard where there was a short supply of water, and where I wished to sink a well. He fixed upon a place, and said there was water about sixty feet from the surface. This proved to be correct, afterwards, I had a well sunk, and found a tolerable supply of water.

He was taken to two other parts of the estate where I was anxious to get a supply of water; but he could not find any there. I afterwards tested him with places where I knew there was water, first at a small spinney, when he immediately said: "There is a large supply of water here and bubbling near the surface." This was the case. A spring about fifty yards off, and which he could not see, as the trees intercepted his view, supplied this village with a constant supply of water. Afterwards we came to a field where water was conveyed by a drainage-pipe from a fish-pond to the kitchen-gardens. When the man crossed the field where the drainpipe was laid, the rod immediately twisted about. Lastly, he was taken to another pipe which was laid under the highway to convey water from a pump in the wood-yard to the stables. When he crossed it the rod twisted up.—*Chambers's Journal.*

BOOKS AND PAPERS.

IT is not an easy thing to make a dictionary or an encyclopædia, but it is always an interesting thing, especially when this dictionary or encyclopædia touches on questions relating to the arts. In this connection I have already drawn attention to the "*Dictionary of Furniture,*" of which the second volume has just appeared, and which is very valuable for artists and literary men. It is a pleasure to turn over the leaves of such a work, to stop at a word taken at hazard and there discover its real meaning, learn its history, and study its different applications. It is very rarely that in the midst of things already known we do not discover one meaning of which we were ignorant, an original explanation which clears away a mysterious and inexplicable point, and from deduction to deduction makes us understand the genealogy of a word, and its rôle in the history of arts and literature.

Viollet-le-Duc has left a valuable monument of this kind in his "*Dictionary of French Architecture,*" from the eleventh to the sixteenth century, and his "*Dictionary of Furniture*" remains and will remain for long the most precious document upon this epoch; but unfortunately these documents stopped at the sixteenth century, which is some distance away from our day. Moreover, Viollet-le-Duc always adopted a point of view peculiar to himself and essentially national. As to everything that relates to the Middle Ages in France, his dictionary will remain the most precious and the most complete; but it is evident that the ages that followed and contemporary time are also very interesting to study, and offer the modern architect much of inspiration. Moreover, however rich in monuments France may be, there are many other countries where architecture and the science of construction have given rise to original formulas which the architect should understand. Hence the need for a long time felt, of an encyclopædia or a dictionary which should continue Viollet-le-Duc's and complete it. Artists and students have already attempted to fill this vacancy in part, but up to the present time the new dictionaries, although presenting much of interest, indeed, did not wholly answer to the needs of the occasion.

M. Paul Planat, director of the journal *La Construction Moderne,* has just published the first volume of an encyclopædia of architecture and construction, which is worthy of being seriously recommended. It is a valuable work to consult, and a curious one to read. The words or heads will not be too numerous; but all those which are treated will be handled in a complete and intelligent fashion and in a very interesting form for the architect. Understanding the enormous difficulties of such a work, M. Paul Planat has, naturally enough, surrounded himself with collaborators, requiring each one of them to treat those subjects which each had already digested. "Some of them have consented to prepare abstracts of their archæological studies into the origin and the ancient transformations of architecture. Others have traced the picture of the phases which art has passed through in modern nations. Others have reduced to brief and substantial articles the rules of practical construction and the laws of building, etc." This method is evidently an excellent one and should give a series of exact results. But these documents must be studied with care. Verbosity must be suppressed, and when it is a question of a special dictionary, such as a dictionary of architecture, care must be taken to pass over articles which are foreign to construction, or at least which have with it only a secondary connection. It is evidently easy to prove that mechanics, metallurgy, chemistry, geology, and even physics, are interesting to know in matters of construction, and that the application of these different sciences may be encountered in many cases. "A notion, at least elementary and practical, of these sciences will make henceforth an integral part of the training imposed on architects," says M. Planat very properly. Still, in the list of subjects treated, too great departure must not be made from those acquirements which an architect should possess which relate to architecture or construction properly so called. The laws of acoustics it is certainly a benefit to know in many cases, as in the construction of a theatre, a concert-hall, or lecture-hall, but then, it is likely that the architect entrusted with work of this kind will consult technical works, where he will find in detail the rules and explanations of which he has need. It is not to a dictionary or even to an encyclopædia of architecture that he will go when making his researches; it is rather to books on physics that he will apply. In the same way if he seek precise information concerning metallurgy and the making of steel, for example, he will seek his information in scientific works. This is a point on which we may complain of M. Planat, in that he has given too great importance to certain articles of this kind, not that they are absolutely useless and devoid of interest, far from that; but it is fair to ask one's self whether they are properly in place and whether they are not treated at too great length for an encyclopædia of architecture. Perhaps, M. Planat has been brought within the reach of a criticism, also, — which is perhaps personal to me and may not be shared by other people — by the method adopted by him in editing the articles. These articles are signed. This may have certain advantages and among others — and this ought to be the most serious — that of giving more authority to such and such interpretation of which an author known and accepted as an authority takes in some degree the responsibility; but this method may also have certain ill effects which have their base in the *amour propre* of the author of an article. A writer before being known would evidently make himself of as much importance and use as possible, but his signature is an engagement of his dignity not to give incomplete or too brief information, or such that its modest tone would have the air of ignorance; consequently he will be less disposed to allow the editor to revise and correct and cut down his article, and the editor will have greater fear of wounding the writer's self-love.

The list of collaborators on the encyclopædia is published at the head of the first volume, where we see the names of MM. André, Member of the Institute, Baudot, Boitte, Corroyer, Daumet, Durand-Claye, Gaudet, Guillaume, Hermant, Laisné, Pascal, Sédille, etc. These names would give sufficient evidence of the serious and exact character of the work. The editor could perhaps, through the suppression of the signature at the end of each article, have reserved for himself more liberty in the exercise of his privileges as editor of the encyclopædia. This is only a slight criticism and may be disputed. Without insisting further, it is better to examine the quality of M. Planat's new work. What will certainly make the book a success is the large part devoted to the study of foreign architecture. German and English architecture occupy in the first volume a very important place, and are treated in a particularly interesting manner. The well-considered text is illustrated by many cuts. This is a most important point — an illustration is the document *par excellence* for

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an architect, who has need to see but less need to read. The article on Germany is illustrated by twenty-four full-page plates and a greater number of cuts interspersed in the text, or which even occupy a full-page; that is to say, the subject is treated as completely as possible in a simple encyclopædia. The different specimens of German architecture, ably presented and judiciously chosen from the different styles, give varied information concerning the structures of that country. Among the most curious may be mentioned the Hôtel de Ville of Schwalenberg, at the end of the fifteenth century, where the timber-work is treated in a peculiar fashion. Also the wooden houses at Hoxter and Hildesheim. Wooden architecture is not the only interesting feature, and we find several characteristic structures in stone, such as the Gewandhaus at Brunswick, an elaborate structure of the year 1590; and the porch of the Hôtel de Ville at Halberstadt, added in 1663 to a Gothic building. This porch is rich in admirable sculpture, and is very elegant in composition. German Renaissance work is really very interesting to study. The art of decoration is carried to a great length, especially in northern Germany, where we discover a characteristic trait; there the decoration consists in covering the surface of the stone with little geometrical ornaments of free design, the ornaments sometimes covering the whole surface of a building as with tapestry: the doorway of the Château of Mersebourg is a curious example. In other places they only decorate the alternate courses, or accentuate certain parts, such as pilasters, string-courses, keys, etc.

Finally, in this article is to be found rapidly sketched "a picture of a school of architecture which has doubtless received inspirations from foreign sources, but which none the less has preserved a character and originality peculiar to it. Less sober, less pure, perhaps, than the French Renaissance, the German Renaissance of the North or the South, by its original fecundity deserves to be better known in France than it is up to the present time." These last lines of the article by MM. Lambert and Stahl resume in a few words the interest of these studies of foreign architecture, now-a-days too much neglected — studies which will make the success of M. Planat's work.

The "*Encyclopédie Nouvelle*" includes, also, biographical notices, studies on the great châteaux of France, etc. The complete work will be contained in six large volumes of two parts each, and will be about a third larger than the dictionary of Viollet-le-Duc. The subscription price will be three hundred francs. M. Planat, together with the publication of this encyclopædia, carries on the publication of the volumes which will form the "*Bibliothèque de la Construction Moderne*," which will contain a series of more practical works and treating of professional matters such as apply to mechanics, and others more specially devoted to architecture as an art. In this second list belongs "*Les Habitations Particulières*," of which the first two parts have just appeared. "Our times, tormented by the remembrance of too many examples which the past has left to us, and which belong to the most varying styles, is making the greatest efforts to devise a style of its own. It is in our public buildings that we can note the happiest successes. Without doubt we discover in them evidence of research, study, and care, a purer and more refined taste than would have been the case thirty years ago; but there were not then customs and new needs which call for peculiar arrangements fitted by consequence to excite a transformation in architecture. But during twenty years there has been developed with the growth of public prosperity kinds of constructions which have not their analogies in the past. Unquestionably there were in the last century vast *hôtels* occupied by the aristocracy and the wealthy, but the customs of display and pomp have nothing in common with our modern ways." With us comfort and hygienic convenience are all-important. Baths, boudoirs, toilet-chambers, are arranged with a perfection entirely unknown formerly. It is in these numberless *hôtels* of every style and all sizes that our age will leave the most distinct mark of its inventive spirit as well as of its fecundity. The interest in this publication it is easy to comprehend; but M. Planat must once more be praised for not limiting himself to the study of French architecture alone. He adds to the engravings colored plates, text filled with sketches and initial-cuts, when he passes in review the private architecture of foreign lands. This is both new and interesting. We can here compare the styles of England, Germany and the United States, which are so charming in their originality; and I am happy to mention that many of the illustrations are borrowed from the *American Architect*. The "*Hôtels Privès*" includes besides the cuts in the text, eighty full-page colored plates, reproduced by a new process, under the form of architectural *rendus*.

COMMUNICATIONS

OFFICE-HOURS.

BOSTON, MASS., August 4, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — About eighteen months ago I received a card (printed) which I infer came from some society of architects, stating the hours agreed upon for opening and closing the office, and the hours are the following: Open at half-past eight A. M., close at half-past five P. M., one hour out for dinner. Will you kindly inform me through your columns if any other architects received such a statement or card, and by what committee of architects such notice was authorized to be sent. I am, dear sir,

Yours respectfully, C. J. BATEMAN, *Architect.*

[WE have not seen any such card and can only say that no movement of the kind has been made by the Boston Society of Architects. The length of the draughtsman's working day is regulated by local custom to some extent, but each office is free to establish its own rules. In Boston, the office hours usually observed are from 9 to 5 o'clock, with "an hour out for dinner." — EDS. AMERICAN ARCHITECT.]

A CORRECTION.

WATERTOWN ARSENAL, MASS., August 8, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In the article "On the Hygrometric Behavior of Certain Woods," the words, "Notwithstanding there was a shower of rain in the meantime," belong to the paragraph preceding that in which they appear. No. 658, Page 51.

Yours respectfully, JAMES E. HOWARD.

NOTES AND CLIPPINGS

THE MONASTERY GARDENS OF ROME. — Next to the wilderness of the ruins, I love the little monastery gardens laid out by contemplative monks. These spots are now nearly all government property. In some cases a few old friars are left as care-takers; and with a half-melancholy air, as if bearing about the consciousness that their day and generation is nearly done, they show the chapels and old gardens, opening even refectories, cells and other sacred places to women, formerly closed from the profane foot of the sex. One of the most beautiful of the old cloister gardens is attached to the sumptuous church of St. Paul's outside the walls. You go to St. Paul's, now, by train from the Piazza Montanara, and after inspecting the new edifice, so grandiose and cold, with its splendid nave upborne by triple rows of marble columns, its marble pavement reflecting the brand-new frescos like polished glass, after you have looked at the 12th-century mosaics that were saved out of the fire which destroyed the old church, it is a relief to get into the cloister, adorned with the delicate caprices of its fairy-like twisted columns and fine inlayings. The whole garden is filled with roses and sweet herbs. In the middle stand the old well and the sun-dial, but everywhere the pink buds and blossoms are turned toward the sun. The mid-day warmth brought the odors of lavender, rosemary and mint, — scents all the brotherhoods seem to love by instinct. Such depths upon depths of peace and quietude filled this monkish rose garden, I felt I could sit there for hours and muse on a skull, without getting too strong an odor of our mortality. For the glorious Italian spring triumphed over death and decay. I must confess to much sympathy for that side of monastic life that runs to such inclosed bits of beauty, full of clarified sunshine, sweet scents and lovely bloom. The prettiest monastic garden I have seen in Rome adjoins the church of San Pietro in Vincoli, where the "Moses" of Michael Angelo and the "Saint Margaret" of Guercino are to be seen. After you have sat a long time before the august figure of the Hebrew law-giver, with the feeling of the old Greeks for their Jove of the Olympian Temple, — that he might rise at any moment and rend the roof, — it is a pleasure to stroll out into this garden. The monastery is now turned into a school for engineers; but the polite attendant is always ready to open the glass door, and let you into a grassy nook planted with tall old orange trees, covered with the golden fruit, into which the banksia rose has clambered with a perfect tempest of blossoms, while spring flowers and blooming shrubs fill it to overflowing, run riot over the paths and paint themselves in vast nosegays against the dark green and golden background. A pair of rooks were fluttering in the shrubbery, the first I had seen, and bright-green lizards slipped away between the stones of the old wall. The silence and freshness were indescribable; and, as usual, the vanished brotherhood had left a savor of sweet, old-fashioned herbs behind them. — *Augusta Larned, in the Christian Register.*

KEELY AS A TUNNEL-BORER. — As a specimen of mid-summer madness we can recommend the following extract from the latest issue of the Theosophical Publication Society (7 Duke Street, Adelphi, London, W. C.) in which is an elaborate paper on "Keely's Secrets," by Mrs. Bloomfield Moore, wherein the "etheric force" is identified as "dynaspheric" force, and one phase of it considered in its relations to the cure of disease. The secretary of the society, R. Harte, in an interesting introduction to the pamphlet, relates the following curious anecdote:

"A short time ago the mining world in America was seized with an inexplicable excitement. The values of gold mines in particular suddenly rose. Presently it leaked out that a syndicate of the longest-headed and wealthiest mining capitalists were quietly buying up all the cheap and apparently worthless gold mines they could hear of, and the people at once concluded that something was up. Then every one of a speculative turn very knowingly began to buy worthless gold-mining shares at ever-increasing prices, and when the little speculators had gorged themselves to the full extent of their financial capacity they asked 'What next?' No one knew exactly what he was after, and everyone looked to the syndicate for the next move, but the syndicate smiling put its hands in its pockets and whistled! After the fever came prostration. The small fry had not, like the syndicate, bought to hold, so they got first uneasy, then alarmed, and finally panic-stricken. A few weeks before the panic occurred, twelve solid men, millionaires, met by appointment in a certain laboratory in Philadelphia to witness an exhibition of the disintegration of quartz by a new method. They were

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mining magnates, who had a tremendous interest in getting the gold out of quartz rock quickly and cheaply. The inventor obliged them by simply touching some blocks of quartz with a little machine he held in his hand; and as he touched each block it instantly crumbled into atomic dust, in which the specks of gold it had contained stood out like boulders in a bed of sand. Then the twelve solid men solidly said: 'Mr. Keely, if you will in the same manner disintegrate some quartz for us in its natural place we will each of us give you a check for —— dollars.' So off they all went to the Katskill Mountains, and there the twelve solid men pointed out a reef of quartz on the side of a mountain as solid as themselves, and Mr. Keely took out his little machine and said: 'Gentlemen, please take the time.' In eighteen minutes there was a tunnel in that quartz mountain eighteen feet long and four and a half feet in diameter. Then Mr. Keely quietly returned to Philadelphia with his checks in his pocket, and the twelve solid men went from New York to San Francisco to gather in the seemingly 'worthless stock' of mines long disused because of the working expense, thus producing the disastrous effect upon the mining world which we have just seen. [All these men bound themselves to secrecy, and this is the first time that this incident has been made public.] How was the quartz disintegrated? That is one of Keely's secrets."

A Canal Lift. — An engineering work of singular magnitude and importance has just been inaugurated at Arques, near St. Omer, in France. The undertaking so successfully inaugurated is the work of Mr. Edwin Clark, C. E., of Great Marlow, and an associate of Stephenson in the construction of the tubular bridge over the Menai Straits. The work comprises a canal lift, superseding the series of ordinary locks, which at present so seriously impede the traffic on the large canal system communicating with Belgium. The Continental canals are on a much larger scale than our own, the canal boats usually carrying from 210 to 220 tons. The ground at this particular spot rising very rapidly, there are five or six locks in close contiguity, involving great loss of time and great cost in their management. By this invention of Mr. Clark's the canal boats are now lifted the whole height of nearly fifty feet at one operation, occupying only a few minutes of time, and no loss whatever of water. This singular machine consists practically of a gigantic hydraulic press, whose piston is 3 feet 8 inches in diameter, and 50 feet in length, by means of which the boats themselves, actually afloat in an enormous tank or reservoir, are bodily raised or lowered, water and all, to the required height. This reservoir is in reality an actual length of the canal itself, made of wrought-iron plates, separated from the rest of the canal by iron gates, which are opened when it is raised into its proper position at the required height. There are two such presses, the one descending while the other is ascending, and they thus balance each other, and no steam engine or other mechanical power is required, although the weight lifted at each operation, including the water and the loaded barges, is very nearly 1,000 tons. Sixteen hundred barges had already been lifted prior to the public inauguration, the task being performed by a single man, whose only work is the opening and shutting of a small valve, and the operation only occupies a few minutes. A smaller lift on this principle was erected by Mr. Clark some years since in Cheshire, and was then patented, but he has just completed a still larger lift in Belgium, which will be opened during the present month. The introduction of this system will in future totally change the whole character of our canal systems, as a range of high hills may be thus easily traversed without any loss of water from the summit, and the same system is now being adopted in Canada for transporting sea-going vessels across the isthmus which intervenes between the Bay of Fundy and the Gulf of St. Lawrence. — *The Architect.*

Some Old-Time Strikes. — In 1796, 1798 and 1799, the journeymen shoemakers of Philadelphia struck for higher wages and were successful. In November, 1803, a strike occurred in New York City which is commonly known as the "Sailors' strike," and which has been generally considered as the first strike in the United States. A number of sailors struck for an increase of pay from $10 to $14 per month. They marched around the city and compelled other seamen to leave their work, but were put to flight by the constabulary, who arrested their leader and lodged him in jail. The strike was a failure. A very singular strike occurred in 1817 in Medford, Mass. Thacher Magoun, a shipbuilder, notified his men that he would not furnish them with the customary grog, and that no liquor should be used in his ship-yard. The men wrote the words "*No Rum!* No Rum!" upon each stick of timber in the yard, and some of them refused to work, but finally gave in. This was paralleled by a general strike of employés upon the railroad between Reading and Harrisburg, Pa., in 1839, where the demand was for an increase of pay from $1 to $1.12½ per day, and for more whiskey, the allowance being a pint and a half per day to each man, dealt out in nine doses. — *From Report of the Commissioner of Labor.*

The Longest Recorded Shot. — A correspondent of the United States *Army and Navy Journal* asks: "What is the longest piece of ordnance that has ever been successfully fired?" and receives the following answer. "If you include in the term ordnance everything that carries a projectile, we should answer fourteen miles. This is the straight tube conveying natural-gas from Murrayville to Pittsburgh. To clear this tube out a projectile known as the 'gum ball' was inserted in the end at the gas well, closely fitting the interior; the gas was then turned on full force and the gum-ball fired through its full length, coming out at the further end in a few minutes."

A Monument to Semper. — Funds have been collected in Germany for a monument to the famous architect, Semper, to be erected at Dresden. It will adorn the Brühl Terrace, and will be the work of Professor Schilling, the author of the Niederwald monument.

TRADE SURVEYS.

The architects of the country have done as much work this year as they did last. The larger percentage of it has been of the cheaper variety of work where the commissions have not been up to the established rate. Builders engaged in large operations found it to their interest to use the skill of a reputable architect rather than go by "the rule-of-thumb." The architects west of the mountains have been generally busier than the architects east. They have been giving attention to a range of subjects and questions of practical value a little more removed from the strict line of the architect's duty than usual. In other words, the architects are making themselves of more use to the builders and investors than they would be if they simply made drawings and watched the construction. There is a wide field to be filled in this direction and the more practical-minded architects are using the opportunities of increasing their earnings by becoming more useful. Advices from a number of interior points in the Western States furnish the gratifying information that a large amount of small house-building work has been undertaken within the past two or three months. The States wherein this activity is most apparent are between Ohio and Kansas If we were to seek for the causes of this activity in house building we would find them to be these: First, labor has been well employed for several years past and the accumulation in the building and loan associations are being used in the erection of dwellings. Next, there is a more general desire among the workers of the country to own their own homes. Third, labor organizations, notwithstanding the harm they have done, have done some good in directing the attention of the workers to the necessity of economy if they would eventually become householders. There are some other influences, such as these: The industries have been spreading themselves Westward and Southward. Railroads are opening up new fields. Land is appreciating steadily in value. The centre of population is moving Westward, and builders and investors know that money expended in house-building is more safely invested than in any other direction. At present they count that the investments made have paid well. Industries that have been struggling in cities are now going into rural places where taxes are lower, wages are lower, and cost of living less and distance to markets shorter. It will be an easy thing to multiply towns like these to a great extent. Their objective point is that the inducement is stronger to build houses. The great body of wage-workers, take them altogether, rank higher than they did years ago. Renters more frequently become buyers. The habits of the working people are also improving and that has its effect. Work is becoming more regular. Employers are more disposed to accede and concede where justice admits. Labor is becoming less arbitrary. Both sides are recognizing the existence of certain unwritten laws.

Thus it is that an immense amount of house-building is in progress of which the newspapers and the public generally seem to know but little. The industries are spreading over the country. It would be a safe guess to state that there is at least ten times as much capital invested in rural localities, or what we may so regard, as ten years ago or even less time. All this means that new houses must be built and that they are being built. This work is only begun. The construction of a transcontinental road a few years ago was looked upon as a great thing for business. The construction now of a thousand little houses is looked upon as an insignificant affair. Western architects have found their best fields of work in small towns throughout Ohio, Indiana, Kansas, Missouri and Iowa. If anything should be done now to obstruct this spread of industrial activity there will be a larger amount of house building done next year and year after. The building trades throughout the country are very fairly engaged. Confidence has increased since July 1st. At the opening of the season there was some general apprehension that the limit of house building had been reached. No such feeling is entertained now in well-informed circles. The people of the United States wish more and better houses than they have. Rapid transit in cities and towns is preparing the way for building enterprises. It is no longer necessary to be housed up within a few blocks of a factory. Real estate is cheap and the owners of it are anxious to sell. There is a disposition to encourage builders by reasonable prices throughout the West and South. The lumber trade continues active in those sections and full prices as a rule are paid. Throughout the East there is less demand and the markets are more largely overstocked because of the large supplies from Southern markets from which complications are feared. Shingles and lath have declined this year and manufacturers are complaining that they are barely making the two ends meet. Lake freights have been low enough to encourage traffic if there were any room for its increase. Yellow pine is arriving in large quantities from all North Atlantic ports and its distribution throughout the country is encouraged by moderate prices and the favor with which builders and architects regard it.

The iron trade produces no new features this week. The steel rail-makers held a meeting this week at Long Branch but did nothing of importance. The merchant-steel makers are busier than the other branches of the steel trade owing to the multiplied uses to which steel is put Four or five immense steel-works are projected and will no doubt be built during the next twelve months. The policy on which manufacturers have been going for some time is to restrict production by keeping prices at a point which will discourage competitors from entering the avenues of production. In some instances where better prices could be secured the advice of trade organizations has been to keep prices down. There has been no further restriction of production within two months. Supply and demand are very nicely gauged. Managers of American industries have succeeded beyond their expectations in harmonizing their conflicting interests, and are maintaining a friendly feeling which will prevent those terrible trade conflicts which have in former years brought disaster to thousands Trade in general is better organized, and the country's requirements are more clearly understood. The centralization which has been going on has resulted in a conservatism, and is beneficial to all interests. The depression in prices is legitimate and not destructive to the capital engaged. Outside capital is debarred from entering crowded channels by a law it cannot overcome. For this reason the managers of our great industries now predict an even range of prices in the next year or two. They do not believe that there will be many, if any, of the panics which have crossed trade in the past years, and have upset the conclusions of the shrewdest business men. Everything looks favorable for the rest of the year. The political campaign will clear up two or three vexed questions and the law-making parties will take their cue from the verdict that will be given. Our manufacturers of productions for exports have been recently encouraged to increase their efforts for the growing trade in foreign markets. Upwards of one hundred American manufactured products are now staple goods in foreign markets against German and English competition. American manufacturers have taken it too much for granted heretofore that foreign manufacturers possessed advantages which could not be overcome. The efforts of the past few weeks have weakened this belief. Large houses are now contemplating a more thorough canvass.

S. J. Parkhill & Co., Printers, Boston.

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ECHELLES DE 5 TOISES / 10 MÈTRES

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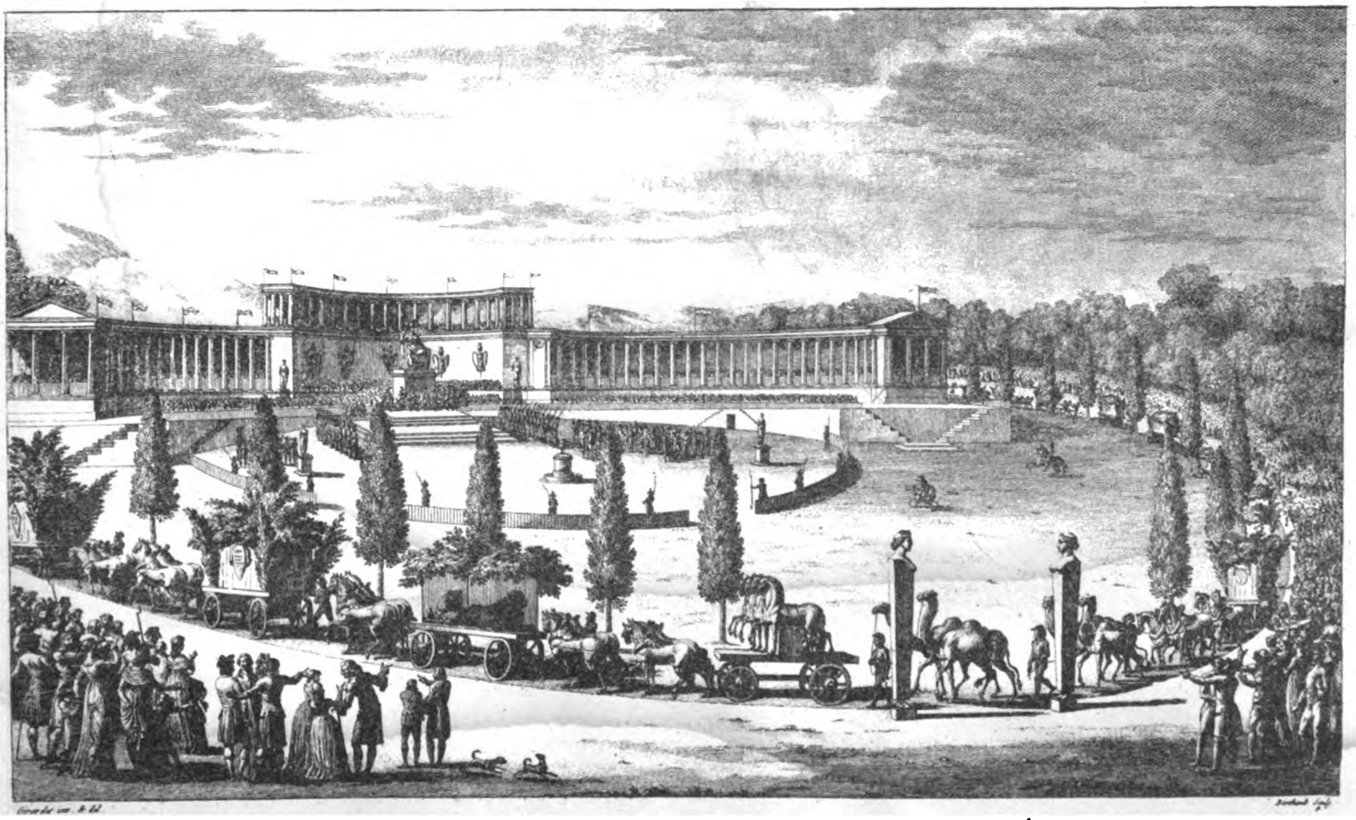

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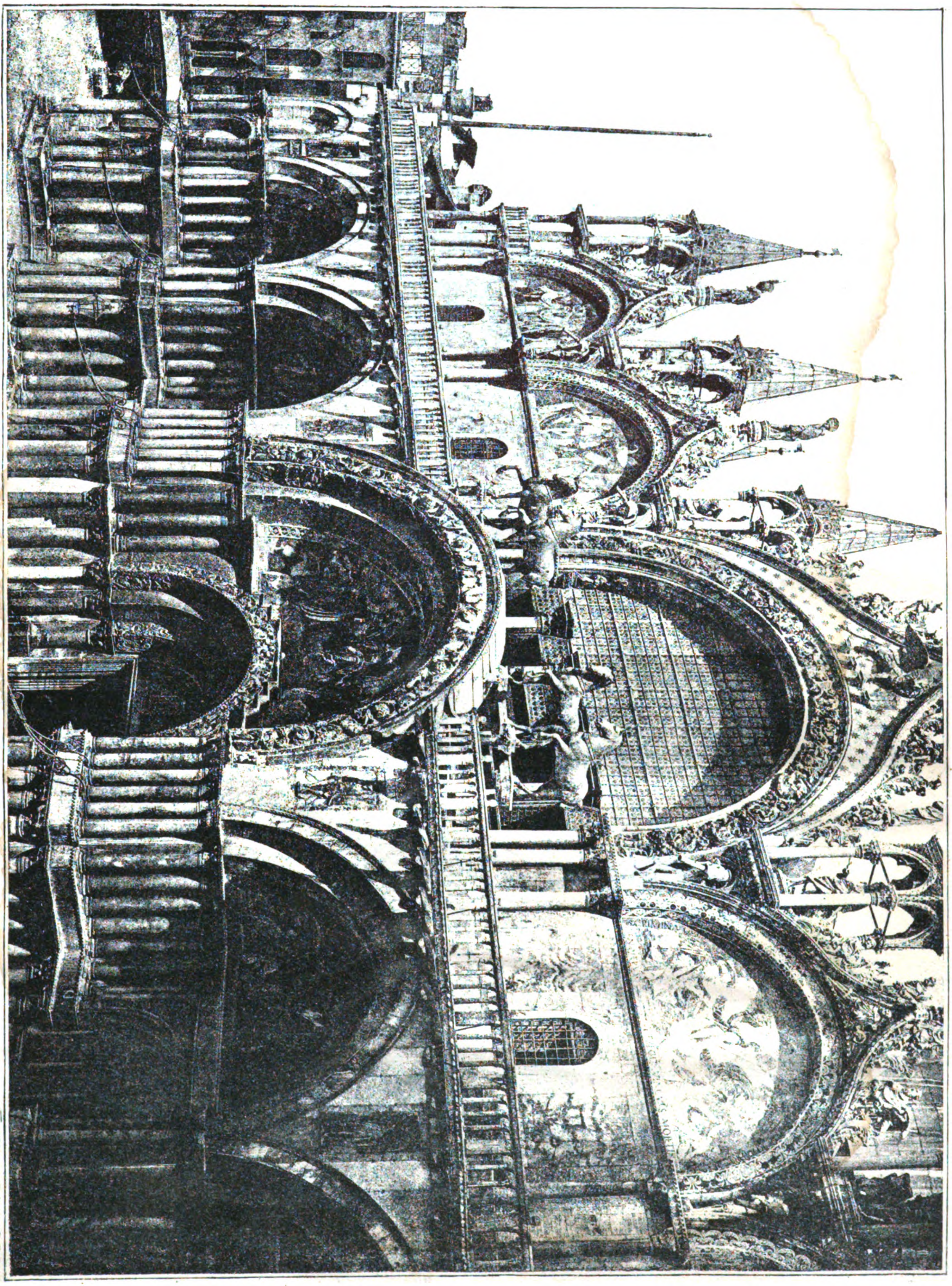

The Portico of St Mark's, Venice.

Heliotype Printing Co. Boston.

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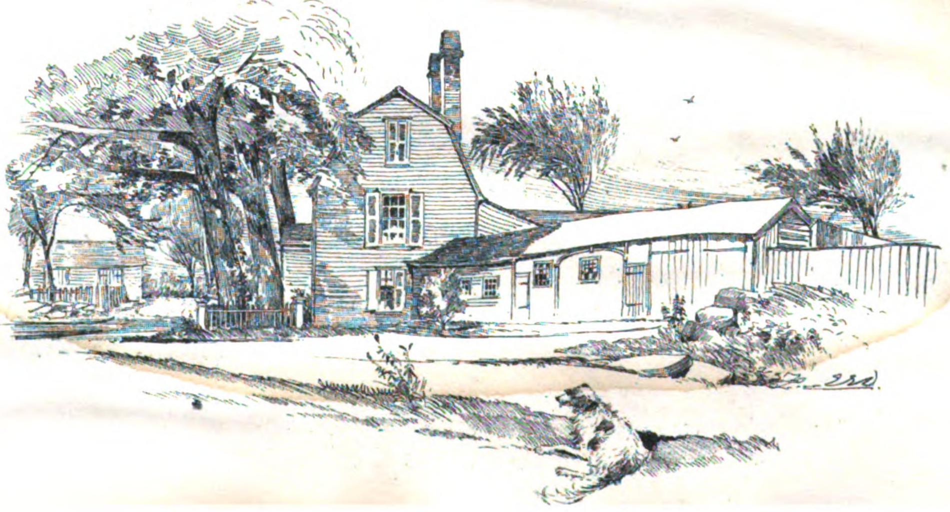
The old "BROOKS HOUSE". West Medford : Mass :



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House of J·S·Betts Denver, Col:

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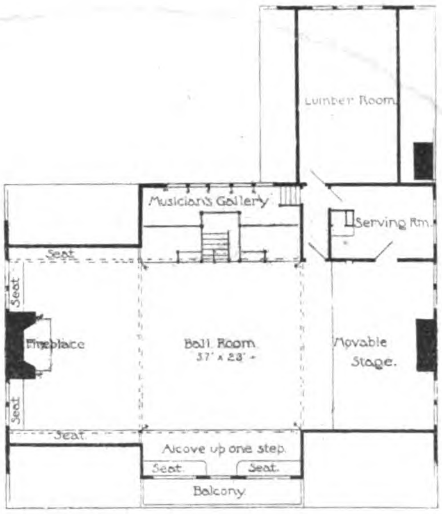

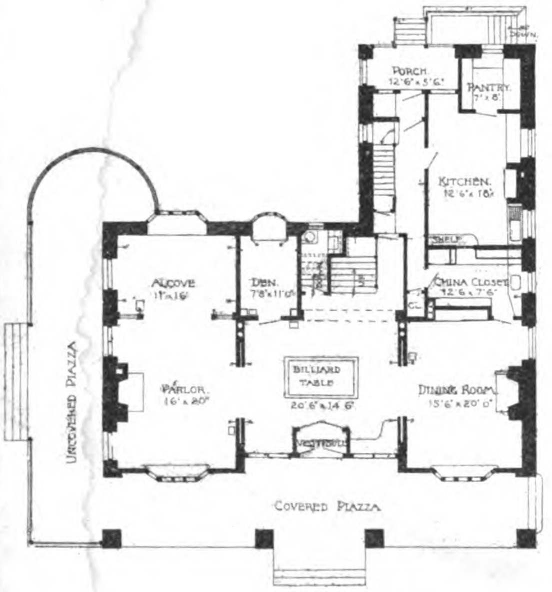

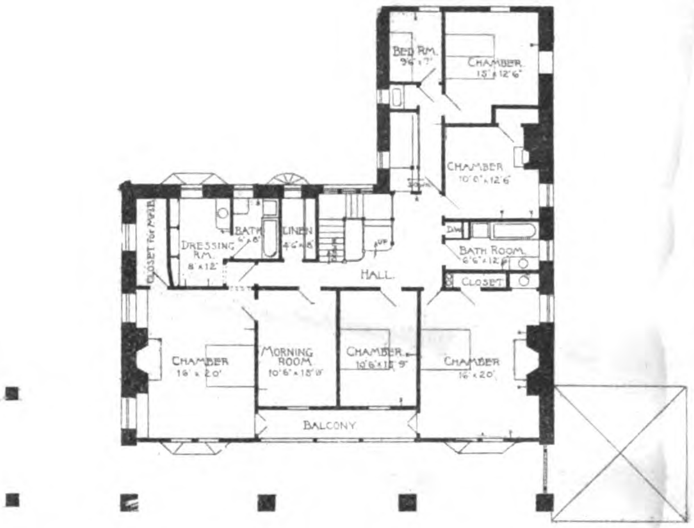

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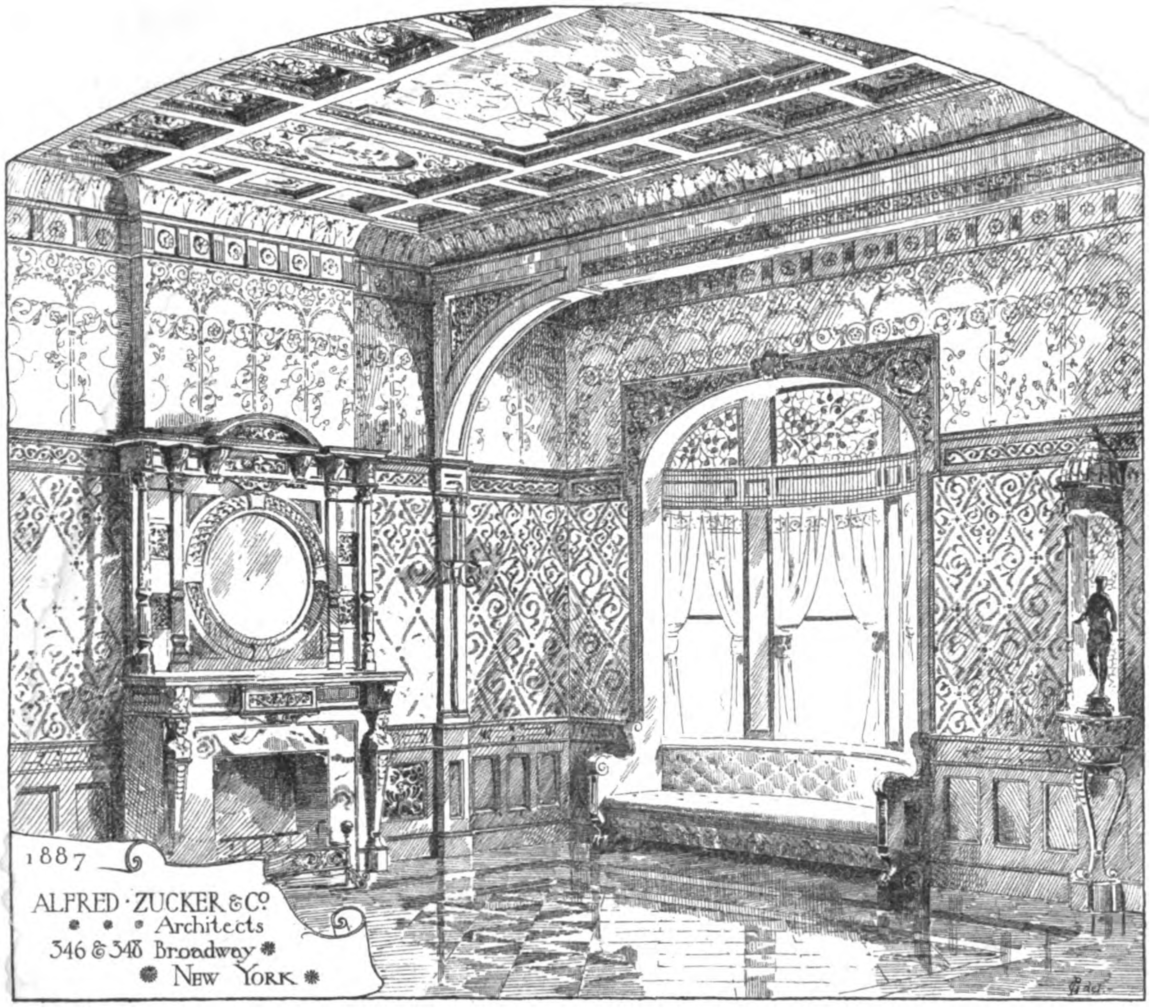

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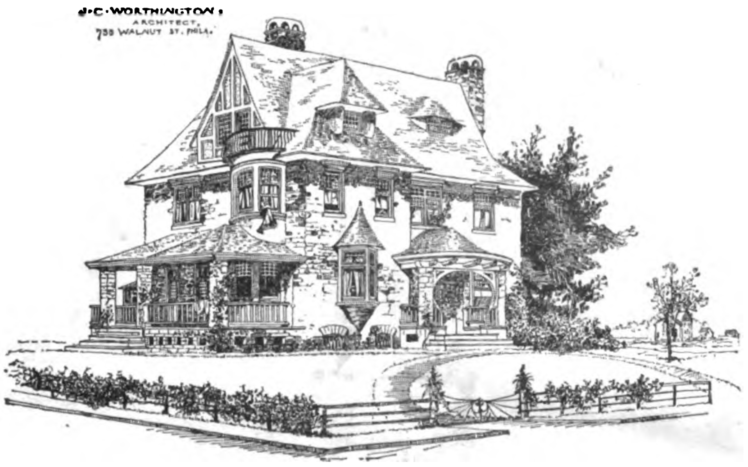

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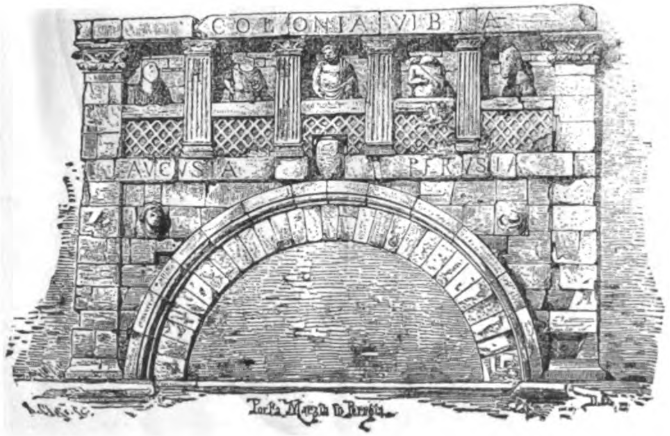
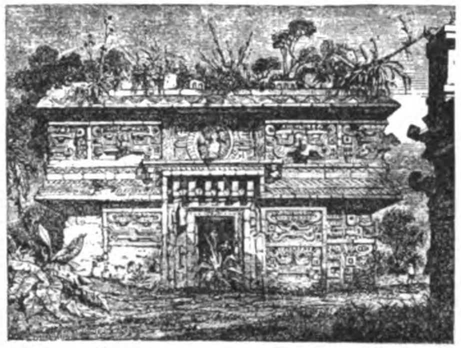


Gateway at Bordeaux, France.

St John's Gate. Clerkenwell London Engd.



From Chichen-Itza. Yucatan.

PORTALS.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIV. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 660.

AUGUST 18, 1888.

Entered at the Post-Office at Boston as second-class matter.

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THE relation of sewer-gases to scarlet-fever and diphtheria, which has been regarded as obscure, if not doubtful, seems to be strikingly shown by a letter from Mr. A. R. Carter, of the Health Department of Baltimore, to the *Scientific American.* Mr. Carter says that during a period of fifty-four years, from 1830 to 1883, there were twelve thousand, one hundred and ninety-seven deaths in Baltimore from scarlet-fever, an average of two hundred and twenty-six per year. In 1883, three hundred and thirty-four fatal cases of scarlet-fever occurred, and, taking into consideration the increase of the city in population, this may perhaps be taken as the normal number, under the conditions then existing. On the first day of January, 1884, an ordinance for the regulation of plumbing went into effect, and has since been enforced with tolerable strictness. During the year 1884 there were one hundred and four deaths from scarlet-fever, or less than one-third as many as the year before. In 1885 the number was sixty-eight, or about one-fifth that of 1883; In 1886 there were thirty-two fatal cases, and in 1887 thirty-six, the mortality for these two years, after the administration of the ordinance had begun to produce some effect, having been only about one-tenth as great as that of 1883, the year before it was adopted. This extraordinary success, considered in connection with the Detroit experiments in disinfecting the sewers, point plainly to the way in which the most dangerous of children's diseases may be kept under control, if not extirpated entirely, and the public will await anxiously the next step which sanitary science may make in this direction. As at Detroit, the Baltimore Health Department found that the mortality from diphtheria was greatly influenced by the enforcement of the new law. During the seven years prior to 1883, the average number of fatal diphtheria cases in the city was four hundred and sixty-nine annually. Since 1883, although for the first year or two the ordinance could not have received sufficiently extensive application to be very effective, the annual average has been two hundred and thirty-four, or almost exactly one-half of the previous average.

AS most people know, the penalty of death by hanging is to be abolished in the State of New York after this year, and the few persons whom New York justice sees fit to remove from this life as a warning to others are to be made way with in the most modern, scientific and humanitarian manner, by means of electricity. How the electricity is to be applied, no one seems to know, but the Legislature of the State appears to have had a vague idea that, if any of its constituents should ever need to be executed, which, judging the immunity extended to Chiara Cignarele, must be a very remote contingency, there would be something grand and modern in applying a tame thunderbolt to them, in place of the hangman's noose, and that a way would be found for making the application when required. Fortunately, perhaps, for the peaceful part of the community, a few patriotic citizens have taken steps to investigate the subject of electrical execution, and it is to be hoped that they will be able to devise an effective method by the time it is required. A few experiments were made, a year or so ago, at Buffalo, by a commission appointed by the Governor, to try to discover the most humane method of carrying out a death sentence, and the conclusion reached by the Commissioners was that the dogs, which were used as illustrations, died most comfortably by being first chloroformed, and then placed in a tank of water, after which a wire was wound around their noses, and the poles of a dynamo connected with the wire and the water. Interesting as this observation was, it shed very little light on the point to be studied, for the obvious reason that criminals are by no means so easily chloroformed as dogs, and without taking away their senses by anæsthetics it would be next to impossible, even if it were desirable, to put them into tanks of water, and wind wire around their noses, preparatory to administrating the fatal shock. Feeling that something still remained to be done, Mr. Harold P. Brown and Dr. Frederick Peterson made use of Mr. Edison's laboratory at Menlo Park for the purpose of trying some further experiments on dogs, and, with the help of the appliances of the laboratory, they have arrived at interesting results. It is found, among other things, that the resistance of different animals to the passage of the current differs greatly, one being not at all injured by a current of fourteen hundred volts intensity, while another died instantly under a current of one hundred and sixty volts intensity. It seems that the resistance lies chiefly in the skin, and is much increased if the skin is covered with hair, and, supposing a current of ample intensity to be provided, it may be difficult to get it to enter the victim's body, unless his hair is at least shaved off at the point of application of the poles. Moreover, the resistance increases with the area of the pole-terminations, so that the iron chair advocated by some persons, in which the patient was to be seated, would be likely to present too large a metallic surface to enable the current to pass freely into the body, while as Dr. Peterson points out, a strong current applied in this way would burn and disfigured the skin. The result indicated by the experiments was that murderers would be most certainly and comfortably disposed of by shaving the top of the head, or cutting the hair very short, wetting the scalp, and applying a small electrode, not more than a quarter of an inch in diameter, while the other electrode, furnished with a wet sponge, should be applied to one of the wrists or to the small of the back. A charge would then pass through the brain and upper part of the spine, instantly extinguishing life, in a manner "rather agreeable than otherwise." If carried out decently, such an execution would have nothing objectionable about it, unless perhaps to the patient, but if there were any uncertainly about the application of the current, the scene might be horribly prolonged by the struggles of the person to be operated on. Apparently, the best application of all would be a lightning flash, or a current of similar intensity, which could be discharged without warning, and without the nervous agony of adjusting sponges and wires. At present, no one knows exactly the tension, as indicated by volts, of a lightning flash, but it is very high. In fact, the energy of the thunderbolt comes almost entirely from its intensity, and very little from the quantity of electricity contained it it, a recent computation having shown that the electricity in an average discharge of lightning would keep a single incandescent lamp, of the ordinary kind, in operation only two or three minutes.

WE regret very much to find that a contemporary for which we have so high a regard as the *Sanitary News* wants the Commissioner of Patents to keep a loaded gun ready to shoot us with, on account, as it appears, of the dangerous mental disorder shown by our modest comments on the de Bausset flying-machine which were printed the other day; and, as we should object to such treatment, we hope we may assuage the *Sanitary News's* alarm by a little further explanation of what it considers our "audacious" idea of the possibility of utilizing gravitation as a means of propelling air-ships, after the method "said to be practised by some birds." It is hardly necessary to say that every one interested in aërial locomotion watches the flight of birds with anxious curiosity, to see if anything can be learned from them which may help in solving the

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great problem, and observers have not yet been able to determine whether the propulsion in flying comes partly from the wings, or wholly from gravitation. With the larger birds, such as the sea-gull and hawks of different kinds, the flapping of the wings serves mainly to lift the body vertically, or nearly so, into the air, the effect being produced by the arrangement of the feathers of the wings, which, when the wings are moved upward, open like blind-slats, allowing the air to pass between them, but, when moved downward, lap upon each other in such a way as to prevent the passage of the air, and enable the wings to exert a powerful downward pressure, which lifts the body in proportion to the effort. The familiar Arnott valve, used in ventilators, the slats of which remain open so long as the draught is into the flue from the room, but close against the slightest down-draught, gives an idea of the action of the wing-feathers in their alternate upward and downward movement.

AS any one may see, by watching a sea-gull rise from the water, a violent and prolonged flapping is first necessary, to lift it vertically, or nearly so, into the air. When it has reached a certain altitude, the flapping stops, and a slight movement of the wings brings the bird into such a position that, with its wings outspread but motionless, it slides down the air, or in other words it allows gravitation to draw it toward the earth, only utilizing the resistance of the atmosphere under its wings to change the movement from a fall vertically downward to a gradual descent, at a comparatively slight angle with the horizon. If the wings were immovable, the motion would continue in a straight line until the bird plunged into the water, but they are both capable of the most delicate adjustment, at the creature's will, and just before touching the water, a slight muscular effort may turn them so as to change the descent into a horizontal movement, which is maintained until the impetus derived from the descent is exhausted, and renewed flapping is required to raise the body to the necessary elevation for another aërial slide. Very frequently, the bird, instead of skimming horizontally over the water until his momentum is exhausted, moves his wings again, so as to direct himself upward with the remaining portion of the same impetus, and thus save himself a few flaps of the wings in ascending for a fresh start.

NOW, although it is generally agreed that to equip an air-ship with machinery for driving it upward proportioned in power to the wing-muscles of a bird would make it too heavy for practical use, it is perfectly possible to lift one, furnished with wings, by means of hydrogen to a height corresponding to that from which a gull or a hawk begins its long flight, and then, by allowing the hydrogen to escape, leave it resting, by means of its wings, on the air, just like a bird balancing itself for a downward swoop. From that point the direction, and even the speed of its movement, might be controlled, simply by setting the wings, until the structure reached the ground; and it would be perfectly possible, after its flight had brought it nearly to the earth, to raise it for a fresh start, by means of a supply of hydrogen brought in a compressed condition, just as a bird would raise itself by flapping its wings. Of course, we do not expect immediately to see balloons soaring about the sky in this manner, and the Commissioner of Patents need not lay in a store of ammunition at present under the apprehension of a visit from us, but, simply as a piece of science, there does not seem to be anything absolutely impossible in the notion, and no method of propulsion which we have ever heard suggested for navigating the air offers anything like the power which could be obtained in this way. There is a man at present exhibiting at the Northern seaside resorts, who suspends himself by a belt, furnished with hooks, to a parachute some eight or ten feet in diameter, and has the parachute taken up into the air by a hot-air balloon, made out of cotton cloth. On reaching a certain height, which is advertised as two thousand feet, but which we are willing to believe a little less, he detaches the balloon by pulling a cord, and descends, sustained by the parachute, in safety to the ground. Having thus solved, like so many others, the problem of descending safely through the air from a great height, it would not be a very long step to the addition of movable wings, controlled by cords, on each side of the parachute, by which the descent might be varied in direction, without increasing the risk of accident; and it is quite conceivable that an apparatus of this sort, cheap and simple as it is, might be found very serviceable, particularly for military use. What might be done with it on a large scale we will not venture to predict, but as a suggestion to those who laugh at the idea of rising five miles into the air at New York, and sailing thence to Liverpool, and who cannot believe that an air-ship can ever be made capable of struggling against wind storms, it may not be amiss to say that the gradient of a course from a point five miles above New York to Liverpool would be a descent of nearly ten feet in a mile, which is enough to give a tolerably rapid movement in such a medium as air; while, in regard to the speed attainable, it should be remembered that if a little bird, weighing two ounces or so, with nothing but its weight and its wings to depend upon, can outstrip the fiercest hurricane, it is not beyond possibility that a structure weighing a million times as much might be so navigated as to pass through the currents of the air as easily as a steamship does through those of the sea.

SOME of our readers will remember that Mr. Norman Shaw is a good deal of a connoisseur in matters of plumbing, and published long ago some remarks on rain-water and soil pipes which were of value. Recently he has turned his attention to the study of drain-pipes, and, not being satisfied with drains as at present laid, has invented a new form. The defect of the ordinary drain-pipes of cylindrical section, with socket-joints, consists, as he says, in the difficulty of laying them in straight lines, and the impossibility of ascertaining whether they are properly jointed or not. In fact, it is very difficult to make a good cement joint with cylindrical tubes, as the cement usually either fails to fill the joint, or, if the joint is filled, the cement projects into the pipe, forming an obstruction which is seldom removed at the right time, if at all, and in either case collects lint and sediment, and leads in time to the complete choking of the pipe, when it is necessary to break up several lengths of pipe, in order to get out the offending one, and replace it with another. To meet these objections, Mr. Shaw has had made for him drains shaped in section like the letter U, or, rather, with the oval profile which is recognized as best for large sewers, but with the top open, a groove or rebate being formed in each edge. The heading-joints have "hubs," or sockets, like those of the cylindrical pipe, but open at the top. To use this drain, the lengths are laid in the trench, and jointed with cement, and, the top being open, it is easy for the workman to rub the joints smooth as the pipes are laid, and for the architect to see whether the trough made by the section of drain is perfectly smooth and straight, before it is covered over. The cover used is simply a series of flat earthenware plates, which fit into the sockets or rebates on the edges, and, after being set in place, are plastered with half an inch or so of cement. The small radius of the invert helps to keep the drain clean, and, if any stoppage takes place, the flat tile cover is easily removed where necessary. So far, Mr. Shaw has used only drains of earthenware made in this way, but he has had some sections made of artificial stone, of Portland cement, sand and small pebbles, and, although he has not yet brought these into actual use, he finds the appearance of them "most fascinating," and hopes for the best results.

WE grieve to hear that the imported laborer who works in the Divine vineyard as rector of the Church of the Holy Trinity, in New York, has been adjudged to hold his position in contravention of the laws of the United States, and the corporation of the church has been condemned to pay a fine of one thousand dollars for inviting him to this country. The case has been appealed to the Supreme Court of the United States, and, in making the appeal, the counsel for the defence has added to his plea the extraordinary claim that the Contract Labor Law, under which the conviction was obtained, is unconstitutional, so far as it applies to importing clergymen, on the ground that it restricts that free exercise of religion which is granted by the Constitution to every man. We shall be curious to see what the Supreme Court will say to this idea, under which, as it seems to us, a congregation might lay claim to the spiritual ministrations of any other violator of a statute, whether in or out of jail, and complain that it was balked of its "free exercise of religion," if he was not immediately released to them. The District Attorney, Mr. Walker, who has a sharp eye for absurdities, and considerable courage in expressing his opinion about them, endeavored to avoid confusing the case with this doctrine, but was obliged to yield. Meanwhile, as the case will probably not be reached in the Supreme Court for two years or more, Mr. Warren is likely to go on with his duties, unless a new complainant should appear.

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ARCHITECT, OWNER AND BUILDER BEFORE THE LAW.[1] — IV.

WHAT is the sort of employment constituted by the acceptance of terms of competition publicly offered is less understood by all parties than it should be. In the first place, it ought to be remembered that whatever contract is entered into between the promoters of a competition and those who agree to their terms is binding on both. Although a promise to do work for nothing is not a contract, and performance of the promise cannot be required, a promise to do work for an inadequate or even a contingent remuneration is valid, and can be enforced. Thus the chance of securing employment, such as forms the inducement held out in competitions, may, if it is clearly offered, form a valid consideration for a promise to submit a design, and an architect who promises to do so in accordance with the terms of competition offered is bound by his part of the contract, and cannot subsequently decline or neglect to send his drawings, except with the consent of the party to whom the promise was made.

On the other hand, the party inviting competitive designs is bound strictly by the terms of the invitation. It is well settled that "an offer of reward or compensation by public advertisement, either to a particular person or to a class of persons or to any or all persons, is a conditional promise, and if any one to whom such offer is made shall perform the service before the offer is revoked, such performance is a good consideration and the offer becomes a legal and binding contract," and it has been decided that the contract thus made is to be regarded as a written one, and therefore not subject to the operation of the Statutes of Fraud or Limitations. If no one should accept the terms offered, by doing the work in accordance with them, the promise contained in them will be still only conditional, and the offer, so long as it remains conditional, may be revoked, but as soon as any one does the service specified in the invitation, he has established his right to compel the persons who issued it to fulfil their part of the contract. There are many cases involving this point, but nearly all of them refer to services rendered in response to public advertisement by finders of lost property, or persons engaged in capturing thieves or reclaiming stolen goods.[2]

Where, as in these instances, the finder of a lost article or the captor of a criminal is compelled to sue for the reward promised by advertisement, he is always successful, provided he has complied with the advertised terms, and it has even been held that a person who found anything lost, for which a reward had been advertised, and who, on offering to restore it to the owner, was refused the promised reward, might lawfully keep the article himself.

Unfortunately, the advertised "invitations to architects" to make designs in competition sometimes expressly stipulate that the architects who accept them shall abandon all claim to fair treatment, as, for instance, a recent one, in which the promoters "promised nothing, but would be governed by what seemed to them for the best interest" of the corporation which they represented; or make promises too vague to be enforced; but where the promise is definite, it will certainly be enforced in favor of those who comply with the conditions which accompany the promise. The most noted case of the kind which has yet been decided, and one of very great importance to architects, is that of Walsh *v.* St. Louis Exposition and Music Hall Association, 16 Missouri Appeals Reports, 502, and 9 Missouri (Supreme Court) 459. This suit grew out of a competition instituted by the St. Louis Exposition and Music-Hall Association, which issued an invitation in the following terms:

"ST. LOUIS, April 19, 1883.

"DEAR SIR, — At a meeting of the Board of Directors of the St. Louis Exposition and Music-Hall Association, held on the 18th day of April, 1883, the following resolutions were adopted:

"*First.* That all architects, residents of this city, and five non-residents, be invited to prepare and submit designs.

"*Second.* That from those presented by residents, seven, which shall be considered the most meritorious, shall be accepted and awarded five hundred dollars ($500) each, and the five presented by non-residents shall each be awarded the same amount. All designs for which are paid five hundred dollars ($500) shall be the property of the Association.

"*Third.* That it should be understood that any foreign architect may submit a design, but if not accepted as the most meritorious of all, he will receive no compensation and his designs shall be returned.

"*Fourth.* The architect who is successful shall not receive five hundred dollars, but he shall be engaged as architect and superintendent and shall be paid for performing such duties the usual commissions as adopted by the American Institute and the St. Louis Institute of Architects.

"*Fifth.* That all architects entering for competition shall so notify the president or secretary on or before May 5, 1883.

"*Sixth.* That said plans and specifications shall be placed under seal in hands of the secretary on or before July 2, 1883, and that they shall be without names or marks to indicate by whom made.

"*Seventh.* That there shall be ground plans of the several floors, drawn to a scale of one-sixteenth of an inch to the foot, and elevations and cross and longitudinal sections, drawn to a scale of one-eighth of an inch to the foot, with descriptive specifications. Elevations to be geometrical and in line simply. No perspective drawings will be admitted. All plans must be simply tinted in India ink. No shaded drawings will be admitted.

"*Eighth.* The said designs and specifications shall be for a building to cost not over four hundred thousand dollars ($400,-000) exclusive of power, electricity and elevator machinery, arrangements for which, however, must be made.

"*Ninth.* As to the building itself and what architects should be requested to include in their plans, we recommend the following features:

"*First.* That building shall not cover more than 480 x 320 feet.

"*Second.* A music-hall, with seats 20 x 30 inches, to seat four thousand people, and arranged so that it can be used for balls, exhibits or dramatic purposes. That the stage shall be large enough to accommodate an organ and seat one thousand persons. The hall to be well lighted, ventilated and with perfect acoustics.

"*Third.* A small hall to seat one thousand two hundred persons, with suitable stage.

"*Fourth.* A basement under building, to be arranged for machinery, carriages and other heavy exhibits, and for power-shafting.

"*Fifth.* Fine art rooms for display of pictures and statuary.

"*Sixth.* Floral hall that will provide for rockery and water displays.

"*Seventh.* General exhibit-hall for all articles.

"*Eighth.* Dressing-rooms, closets, etc., for public use.

"*Ninth.* Boiler-rooms, coal-sheds, etc., away from building.

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[1] Continued from page 267, No. 650.

[2] Ryer *v.* Stockwell, 14 Cal. 134; Symmes *v.* Frazier, 6 Mass. 344; Loring *v.* City of Boston, 7 Met. 411; Wentworth *v.* Day, 3 Met. 352; Gilmore *v.* Lewis, 12 Ohio 281; England *v.* Davidson, 11 A. & E. 856; Lancaster *v.* Walsh, 4 M. & W. 16; Williams *v.* Cowardine, 4 B. & Al. 621; Hunt *v.* City of Utica, 18 N. Y. 442.

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"*Tenth.* Arrangements for elevators to high parts of building."

This invitation was sent to Mr. Thomas Walsh, of St. Louis, who notified the officers of the Association of his intention to submit plans in accordance with it, and prepared and sent in accordingly two designs in compliance with the requirements. One of these designs was, as he afterwards learned, decided to be the best submitted, and was retained as the property of the Association, but another person was appointed architect of the building, and work was commenced. Mr. Walsh then presented a claim to the appointment, and informed the officers of the Association that he was willing and ready to undertake the work of architect and superintendent of the building. On their refusal to transfer the commission to him, he brought a suit for damages, which, under the usual rule, that the measure of damages for the refusal of one party to fulfil a contract is the profit which the other party would have derived from its complete execution, he laid at twenty thousand dollars, or five per cent on the estimated cost.

The Music-Hall Association did not deny that Mr. Walsh's design was placed first, but resisted his claim on the ground that nothing in its proposal implied an unconditional obligation to employ as architect or superintendent the person whose design might be found the most meritorious or acceptable of those submitted, and no such promise being intended or made, Mr. Walsh had no ground of action. The Circuit Court, in which the case was first tried, sustained this view, and gave judgment for the defendant. Mr. Walsh then took the case to the Court of Appeals, which reversed the finding of the court below, and ordered a verdict for the plaintiff. Another appeal was then taken by the opposite side to the Supreme Court, which fully affirmed the decision of the Court of Appeals, and probably established the law on the subject in this country.

The stipulation on which Mr. Walsh relied for proving the conditional promise, of which he, having fulfilled the conditions, was entitled to the benefit, was the fourth, which read: "The architect who is successful shall not receive five hundred dollars, but he shall be engaged as architect and superintendent, and shall be paid for performing such duties the usual commissions as adopted by the American Institute and the St. Louis Institute of Architects." The Association explained this by saying that the expression "the architect who is successful" was not intended to mean necessarily the person who submitted the best plans, as this might be some one unfit to be trusted with the responsibility of execution, but that it meant the architect who should, on the whole, be considered worthy of the appointment.

It is surprising that such transparent sophistry should have imposed upon the Circuit Court, but it did not for an instant blind the keener eyes of the judges of the Court of Appeals, who say, in their opinion, that "the whole tenor of the proposal demonstrates that no such application of the words was thought of in the framing." "Who is the person intended by the expression, 'the architect who is successful?'" they asked. Twelve architects are promised a reward of five hundred dollars each. It is obvious that to be one of these is not to be the "successful" person, for the five non-resident architects receive their five hundred dollars without any regard to the quality of their work, and the whole tenor of the circular shows that it is intended to stimulate the powers of competitors by promising something to the one person who shall surpass all the others in doing the work which the invitation specifies. This one, clearly, is the "successful" competitor meant by the circular, and "if the plaintiff, as he avers, did prepare and hand-in designs, plans, elevations, sections and specifications which were, upon examination and consideration by the defendant and its Board of Directors, considered and declared as the most meritorious of all those that had been submitted to it under said proposal, and the same were accepted by said defendant as such, he thus became the successful architect to whom the fourth clause of the proposal distinctly promises the superintendency."

[To be continued.]

Accident to Seville Cathedral.—A pier of the Cathedral at Seville failed August 2d, causing a portion of the roof of the nave to collapse. The falling débris destroyed the organ and did other damage to the cathedral. It is said that not less than $500,000 will be needed for the repairs, part of which sum will be raised by a national subscription.

BUILDERS' HARDWARE.[1]—III.

NAILS.

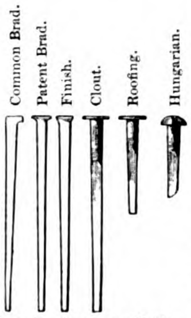

Fig. 1. Common Nails. (Half Size.)

The nails commonly used in connection with building operations are too well-known to require any description. They are specifically designated as plate-nails. Up to within a comparatively short time, nails were made by hand almost entirely by women and children, and it is one of the best arguments in favor of the introduction of machinery that the process by which nail-making has been perfected has released a vast multitude from the laborious and wearing occupation, besides giving a great deal better results. The application of machinery to the manufacture of nails is purely an American idea and so recent have been the innovations in connection with this industry that we imagine many people would be surprised to know the changes which have been made both in the form and in the character of the ordinary nails, during the past generation. It is only about fifteen years since iron nails were annealed, or capable of clinching without rupture.

In the manufacture of nails the iron is first rolled into plates having a thickness equal to the desired thickness of the nail and a width a little greater than the length of a finished nail. The plates are cut so that the length is at right angles to the grain, the idea being that when the nails are cut out the fibre will run lengthwise the nail and thus make up much stronger. Special machinery cuts the nails out in alternate wedge-shaped slices so that the metal is used without any loss. The wedges are picked up, held in a vise, the heads stamped on them, and the finished nails finally dropped out into the casks. The machinery is too complicated to allow of any description here, but the process is very simple and easily understood. Nearly all the common nails are made from plates. Hand nails are still made for special uses such as for horse-shoeing, but the cost is too great and hand-made nails are really no better than those which are made by machinery.

Nails are designated according to their length by pennies. The origin of the designation is generally assumed to be in the old system of weights, the nails being made with as many pennyweights of metal as the number indicates. This designation, of course, no longer holds good, as nails have changed materially both in size and weight, but it is still retained for common convenience and we believe the gradation is uniform with the various manufacturers. The weights run from two to seventy penny and the nails vary in length from one inch to six inches. Six-inch nails and larger are more properly designated as spikes, though the trade recognizes a special form of nail of somewhat stouter proportions, made in several of the larger lengths and technically sold under the name of spikes.

Trautwine's "*Pocket-Book*," page 425, gives the sizes, etc., of nails as follows.

Name.	Length, inches.	No. to pound.
3d	1¼	557
4d	1½	336
5d	1¾	210
6d	2	163
7d	2¼	123
8d	2½	93
10d	3	66
12d	3¼	50
20d	4	32
30d	4½	19
40d	5	16
50d	5½	13

Common nails are now very largely made of a low grade of steel, the cost being not over ten cents per hundred pounds more than in wrought-iron.

In regard to the strength of nails, Trautwine also states that boards of oak or pine nailed together by four to sixteen tenpenny common cut-nails and then pulled apart in a direction lengthwise of the boards and across the nails, tending to break the latter in two by a shearing action, averaged from three hundred to four hundred pounds per nail to separate them as the result of many trials. "*Johnson's Encyclopædia*" states that the rough surface of a cut-nail adds about twenty per cent to its holding power. The absolute resistance nails will offer to withdrawal varies so widely with circumstances, that no satisfactory results are available.

[1] Continued from No. 659, page 63.

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The sizes of nails used for specific purposes is largely a matter of judgment on the part of the builder, but the common custom is to use four-penny nails for shingling and slating, six-penny for clapboarding, sixes and eights for finish, eights and nines for flooring, nines and tens for boarding and forty-penny and upwards for framing. Architects sometimes consider it well to specify the sizes of nails to be used for bridging the floor-beams, and for slating, but on general principles we would suppose that a builder who would need any such restrictions would not be a man to employ under any circumstances.

Nails are commonly sold by the cask of one hundred pounds. The following are the net prices in the Boston Market.

PRICES FOR CUT-STEEL NAILS, JUNE 20, 1888.

COMMON, FENCE AND SHEATHING.	per keg.	FLOORING.	per keg.
50d — 60d — 70d	$2 50	12d and larger	$2 75
12d — 20d — 30d — 40d	2 25	10d	2 85
10d	2 35	8d and 9d	3 00
8d and 9d	2 50	6d and 7d	3 15
6d and 7d	2 65	FINE FINISHING.	per keg.
4d and 5d	2 85	12d and larger	$3 15
4d lt. and 3d	3 25	10d	3 25
3d fine	3 75	8d	3 40
BOX.	per keg.	6d	3 55
12d and larger	$2 75	5d	3 75
10d	2 85	4d	3 75
8d and 9d	3 00	2d	3 75
6d and 7d	3 15	2d fine	4 20
5d	3 35	SLATING.	per keg.
4d	3 35	6d and 7d	$2 90
3d	3 75	4d and 5d	3 10
		3d	3 50
SPIKES, of all sizes			$2 50

Common nails can be had galvanized in all the ordinary sizes. Galvanized nails cost 2½ cents per pound extra.

Canada wrought nails are sold for $16.00 per cask. Clinch nails (annealed) cost from $3.10 per cask for ten-penny, to $4.50 for two-penny. Swedes-iron nails are made from an extra quality of wrought-iron, and are especially used for slating, as they are supposed to stand the weather better than ordinary plate-nails. When made from genuine Swedish iron, four-penny nails are sold at $5.50 per cask. American-iron Swedes are $3.85 per cask. Architects usually find it advisable to specify tinned Swedes-iron nails for roofing-work. Tinning adds from twenty to fifty per cent to the cost, depending on the number of nails to the pound.

Finishing-nails are lighter and thinner than common plate-nails, and besides being made quite smooth, they have very slight heads, to permit of being easily countersunk in the wooden finish. They are made in a number of sizes, from ⅝ to 2½ inches in length. Next to finishing-nails are the common brads, made with a head in the form of a shank on one side. The sizes are from ¼ inch to 2 inches in length. Brads are used for small finish, tacking on panel mouldings, etc., the metal being quite thin and the brad driven edgewise of the grain so as not to split the wood. Swedes-iron patent brads are manufactured by the Stanley Works, and sold at from 18 cents to $1.25 per pound, with a discount. Common brads are listed at the same prices. Clout nails are made with broad, flat heads, and are sold in sizes varying from ⅝ inch to 2½ inches in length and costing from 48 to 13 cents per pound, with a discount. They are used about a building chiefly for tacking gutters, etc. Hungarian nails are a species of large, rounded-headed tacks. They are made from ⅝ inch to 1¼ inch long, and average 60 cents per pound, with a discount. Figure 1 illustrates the various special forms of common nails.

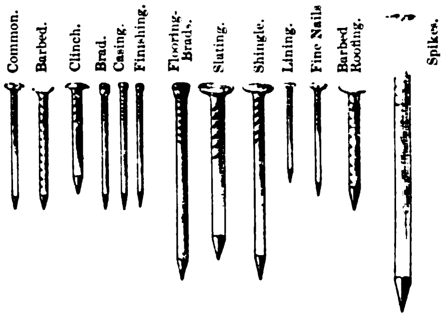
All of the foregoing may be classed as common or plate nails. Nails of a very different kind, manufactured from steel wire, have been in use for a number of years in America and for a longer period in Europe, and in both places they have been very favorably received and are fast superseding the common cut-nails for many purposes. The advantages of these over the common nails are many. For the same amount of metal they are much stronger; they can be driven into very thin boards without splitting them, and can be removed without leaving so unsightly a hole as is usually made by the common nails. Besides this, on account of their superior stiffness they can be driven into very hard wood, where much caution is necessary if common nails are to be used. They are also more easily produced and are handled with less labor. They are manufactured by a simple machine which is automatic in its action, a coil of the wire adjusted to it being cut off in even lengths, headed, pointed and, if necessary, ribbed according to the kind of nail which is desired. The same sizes prevail for these as for the ordinary plate-nails. The following table gives the lengths and number to the pound as listed by the Salem Nail Company, also the net retail prices per hundred pounds in the Boston market.

TABLE OF BEST QUALITY OF STANDARD STEEL-WIRE NAILS.

Size.	Length.	Number of Nails to One Pound.	Price per Keg.
2d Common.	1 in.	1200	$5.00
3d "	1¼ "	720	5.00
4d "	1½ "	432	4.00
5d "	1¾ "	300	4.00
6d "	2 "	252	3.70
7d "	2¼ "	186	3.70
8d "	2½ "	132	3.35
9d "	2¾ "	105	3.35
10d "	3 "	87	3.15
12d "	3¼ "	66	3.00
16d "	3½ "	51	3.00
20d "	4 "	35	3.00
30d "	4½ "	27	3.00
40d "	5 "	21	3.00
50d "	5½ "	15	3.35
60d "	6 "	12	3.35

Other manufacturers occasionally classify the nails in a more natural way by lengths and numbers. The American Screw Company of Providence, R. I., manufactures a very extended line of these nails and sells them in lengths varying from three-sixteenths inch to twelve inches in length, with a thickness of wire varying from No. 22 to No. 0 wire-guage. The prices are by the pound. Everything above two inches, No. 9 wire, is sold at five cents per pound. For smaller sizes the prices increase up to fifty cents per pound for 3-16 of an inch, No. 22. For nails with special heads or special points add one cent per pound. For nails combining all these specialties add one cent per pound for each specialty. For tinning add fifty per cent.

Besides the common wire nails the Salem Company makes a variety of patterns such as fence, clinch, smooth, box, casing, finishing, common brads, flooring, slating, shingle, fine nails, and wire spikes. The wire spikes are made in sizes from three to nine inches long averaging from fifty to four and a half nails per pound. Figure 2 shows the shapes of the different nails. Besides these there are several other special makes not relating to builders' hardware. The variety of nails manufactured from wire is very extensive, and the nails are deservedly popu-



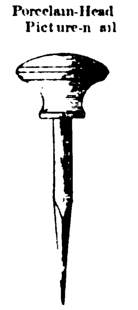


Fig. 2. Wire Nails. (Half Size.) Salem Nail Co. Fig. 3. Fig. 4.

lar. They do not hold quite as strongly against pulling out as the common cut-nails but in every other respect they are, on the whole, rather superior.

There are several kinds of ornamental nails manufactured for special purposes. Figure 3 shows the common porcelain-headed picture-nail. P. & F. Corbin manufacture nails of this description from two and one-half to four inches in length at prices from $3.88 to $6.50 per gross. Brass-headed nails, Figure 4, are manufactured by the same firm in nine sizes, from one

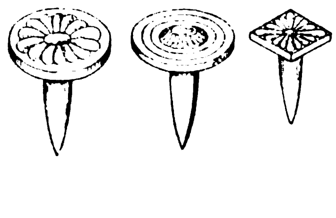


Fig. 5. Brass Door-Nails. (Half Size.) J. B. Shannon & Sons.

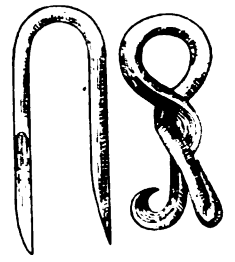


Fig. 6. Clinch Staples.

inch to four inches in length and from $1.05 to $4.00 per gross. These prices are with a discount.

There are also a few styles of ornamental door nails manufactured. J. B. Shannon & Sons show three varieties in

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their catalogue, Figure 5. These are made in iron and bronze, at 50 to 72 cents per dozen, or in brass at 90 cents to $1.25 per dozen, list price.

In connection with nails may be mentioned the common staples such as are used for blind slats, etc. These are sold in various sizes, from three-eighths of an inch to one and one-fourth inch in length, costing from forty-four to twenty-eight cents per pound. The Florence Tack Company, as well as several other manufacturers, carries a line of steel and iron clinch staples such as are shown by Figure 6. These are made in a number of sizes from five-eighths of an inch up, and cost from thirty cents a hundred and down.

TACKS.

Tacks are of comparatively little value to the builder, being used more especially for carpets, furniture, saddlery and the like. The various lengths of common tacks are designated by ounces, the size of the tack indicating the number of ounces put in a paper when packed full weight.[1] The lengths are always essentially the same with the different manufacturers, for the same weights. Tacks are cut by much the same kind of machinery as is used in the manufacture of plate nails. Steel, American-iron, Swedes-iron and copper are used for tacks. Iron is sometimes galvanized and occasionally nickel-plated or tinned. Figure 7 illustrates the relative sizes of tacks manufactured by the Stanley Works, and the following table gives the list prices of the same company.

TABLE OF TACKS (Stanley Works).

Size.		American-Iron.			Swedes-Iron.			Copper.		
		Price per doz.		Price per lb.	Price per doz.		Price per lb.	Price per doz.		Price per lb.
Ounce.	Inch.	Full weight.	Half weight.	Pound boxes, or bulk.	Full weight.	Half weight.	Pound boxes, or bulk.	Full weight.	Half weight.	Pound and half-pound boxes, or bulk.
1/2	1/8	....	....	....	$0 60	$0 30	$1 60	$1 12	$0 56	$3 00
3/4	5/32	....	....	....	70	35	1 25	1 12	56	2 00
1	3/16	$0 80	$0 40	$1 00	80	40	1 00	1 12	56	1 50
1½	7/32	90	45	80	90	45	80	1 30	65	1 15
2	1/4	90	45	63	1 00	50	66	1 40	70	95
2½	5/16	1 00	50	55	1 10	55	58	1 60	80	85
3	3/8	1 10	55	50	1 20	60	52	1 80	90	80
4	7/16	1 20	60	44	1 40	70	46	2 00	1 00	66
6	1/2	1 30	65	34	1 60	80	36	2 52	1 26	56
8	9/16	1 50	75	30	1 90	95	32	3 36	1 68	56
10	5/8	1 60	80	28	2 20	1 10	30	4 20	2 10	56
12	11/16	1 80	90	26	2 50	1 25	28	5 04	2 52	56
14	3/4	2 00	1 00	24	2 80	1 40	26	5 88	2 94	56
16	13/16	2 20	1 10	23	3 00	1 50	25	6 72	3 36	56
18	7/8	2 40	1 20	22½	3 30	1 65	24½	7 56	3 78	56
20	15/16	2 60	1 30	22	3 60	1 80	24	8 40	4 20	56
22	1	2 80	1 40	21	3 80	1 90	23	9 24	4 62	56
24	1⅛	3 00	1 50	20	4 00	2 00	22	10 08	5 04	56

Tinned tacks can be had in iron or copper, in all the above sizes, at an advance of from twenty to thirty per cent.

Double-pointed tacks have, within a few years been made from flat steel wire. Five sizes are made by the Florence Tack Company, from seven-sixteenths to three-fourths inches long, varying from $1.20 to $1.80 per dozen boxes. They can be had plated, tinned or in copper. The advantage of these tacks is that they hold more tightly in the wood and at the same time are more easily removed without breaking off in the hole.

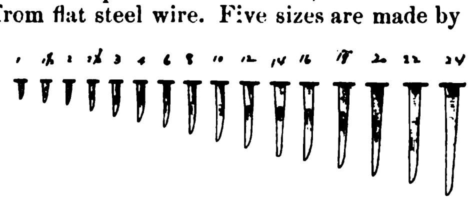


Fig. 7. American-Iron Cut Tacks, (Half Size.) Stanley Works.

[To be continued.]

[1] This statement is made in the catalogue of the Florence Tack Co.

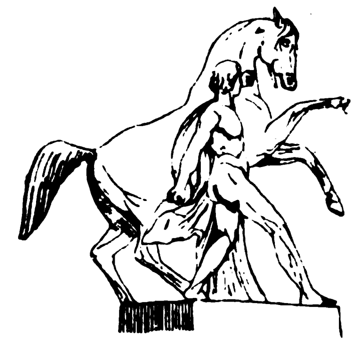
[2] Continued from No. 659, page 61.

[3] Guillaume Coustou, the sculptor of these horses, was born at Lyons in 1678. He studied under Coysevox and won the grand prize of the Academy and went to Rome. Returning to Paris, he was received into the Royal Academy and gained much reputation by his works. His principal works are marble groups of Daphne and Hippomenes and Ocean and the Mediterranean for the gardens at Marly: marble statues of Louis XIV and Cardinal Dubois; a bronze statue of the Rhone at Lyons; bas-reliefs of "Christ with the Doctors"; "St. Louis de Gonzague" and "Hercules on the Funeral Pile," and an equestrian bas-relief of Louis XIV, on the Invalides. He died in 1746. His brother Nicolas and his son Guillaume were both noted sculptors.

EQUESTRIAN MONUMENTS.—III.[2]

THE HORSES OF MONTE CAVALLO.

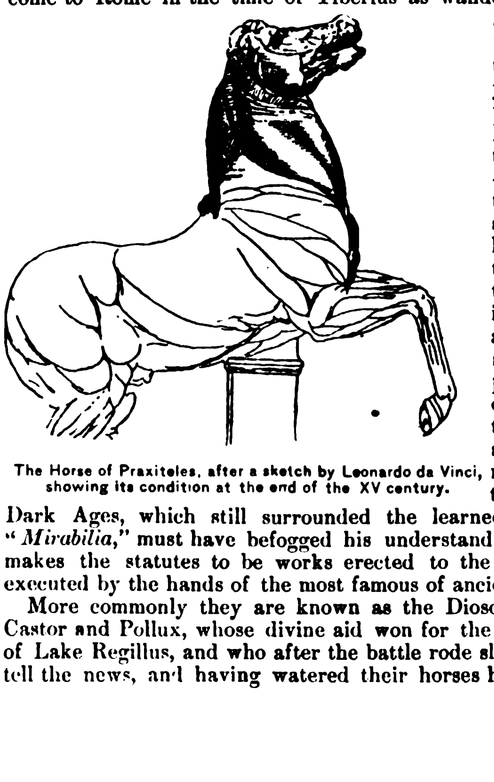
"When we drive out from the cloud of steam, majestical white horses, Are we greater than the first men who led black ones by the mane?"
Mrs. Browning.



Horse-tamer at Stuttgart, Germany. Hofer, Sculptor.

A FAMOUS group of antiques which has an ancillary interest, is formed by the colossal statues and marble horses on the Piazza del Quirinale, formerly the Monte Cavallo, at Rome, the prototypes of various groups of "horse-tamers" such as the two groups at the entrance to the Champs Elysées from the Place de la Concorde, at Paris, by Coustou,[3] the more recent ones on the Pont de Jena, Paris, erected at the time of the exhibition of 1878, and the similar subjects by Hofer at Stuttgart, and those by Mandl at Salzburg, while Berlin possesses other interpretations to which have been given the political nicknames "Gehemmter Fortschritt"—progress checked and "Beforderter Rückschritt"—retrogression encouraged. The groups at Rome with the red granite obelisk, forty-eight feet high, behind them, are possibly the most widely known pieces of sculpture in the world. Those who have not seen them are familiar with the photograph which shows the rampant animals swaying out to right and left and checked by the nude and firmly-braced figures of the "tamers." Common fame credits the work to Phidias and Praxiteles, and these august names are cut upon the bases. Authority for the belief dates from the thirteenth century, for the "*Mirabilia Romæ,*" at that time written, recounts the fable that these naked athletes are none other than the famous sculptors themselves, and naked in token of the clear-sightedness of philosophical science; for these famous Greeks are fabled to have come to Rome in the time of Tiberius as wandering philosophers, and taking a hint from the proposition "a penny for your thoughts"—which must have been current in those good old days—bargained for the erection of statues in their own honor provided they could disclose to the emperor his inmost thoughts: and these are the statues, a living proof of the truth of the tale and their vaticinatory success. One cannot but believe that the mists of the Dark Ages, which still surrounded the learned compiler of the "*Mirabilia,*" must have befogged his understanding, for the legend makes the statutes to be works erected to the honor of and not executed by the hands of the most famous of ancient sculptors.

The Horse of Praxiteles, on the Monte Cavallo, Rome, after a print anterior to 1546.



The Horse of Praxiteles, after a sketch by Leonardo da Vinci, showing its condition at the end of the XV century.

More commonly they are known as the Dioscuri, the twin gods Castor and Pollux, whose divine aid won for the Romans the battle of Lake Regillus, and who after the battle rode slowly into Rome to tell the news, and having watered their horses headed toward the

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Temple of Vesta and suddenly disappeared. Macaulay, who has a deeper knowledge than most how to make an historical incident immortal, records that:

> "—On rode the strange horsemen
> With slow and lordly pace
> And none who saw their bearing
> Durst ask their name or race.
> On rode they to the Forum,
> While laurel-boughs and flowers
> From house-tops and from windows
> Fell on their crests in showers.
> When they drew nigh to Vesta
> They vaulted down amain,
> And washed their horses in the well
> That flows by Vesta's fane.
> And straight again they mounted,
> And rode to Vesta's door;
> Then like a blast, away they passed
> And no man saw them more."
>
> *The Battle of Lake Regillus.*

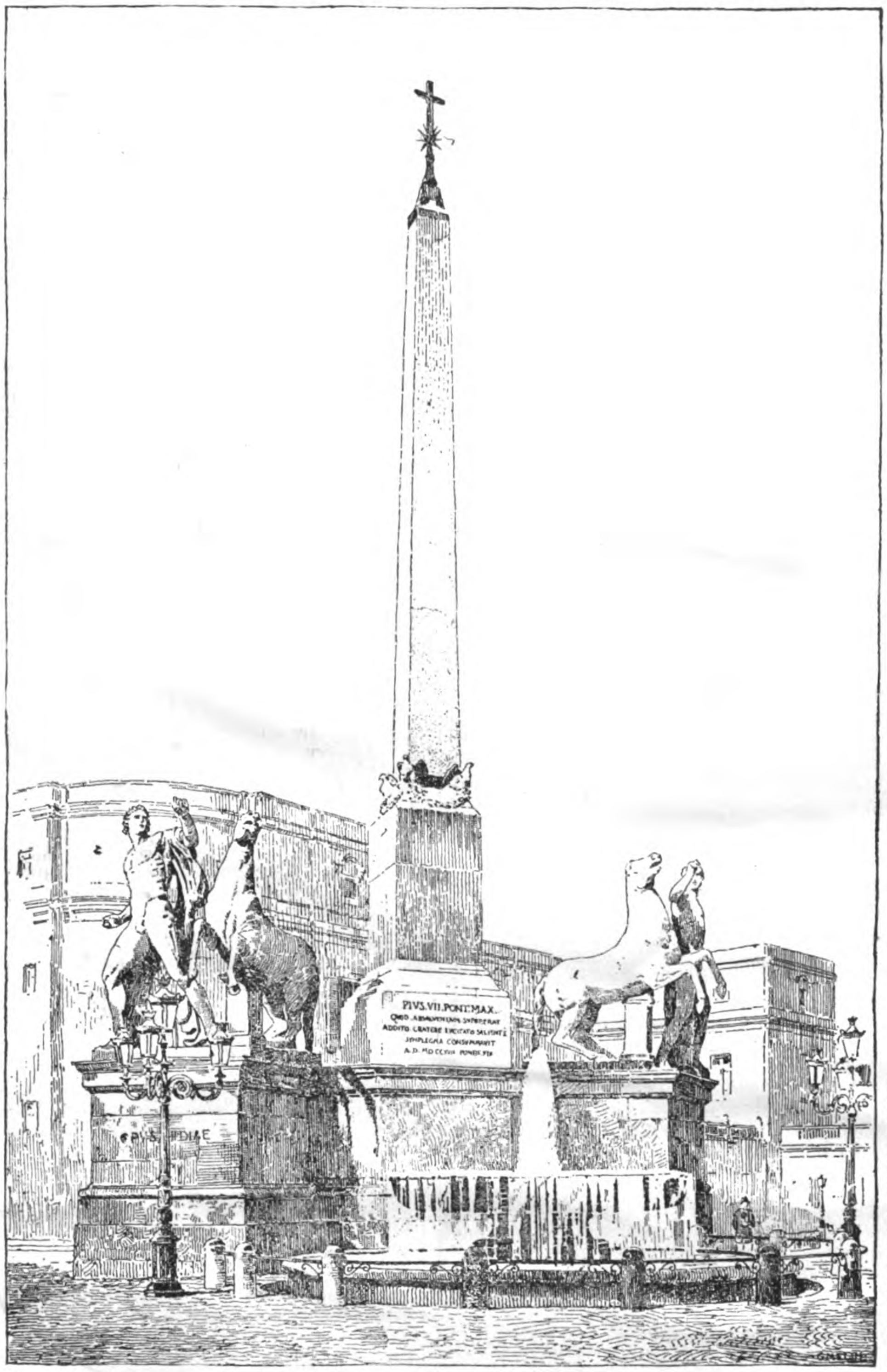
Most people will agree that it is much more likely that sooner or later sculptors should do something to immortalize the "Great Twin Brothers, who fought so well for Rome," than that they should find an inspiring theme in a bit of vulgar divination with which horses seem to have no possible connection. Whether or no posterity is right in ascribing these works to Phidias and Praxiteles, they are said to be the work of hands trained in the same school, and date between 450 and 400 B. C., and although between the time they were actually executed and the earliest record we have of them centuries elapsed, there is a chance that mouth-to-mouth tradition may have kept the record true in this case as it has in so many other instances. At any rate, no one seems to know where they came from, if they were trophies rapt from some Grecian city, and not works executed in Magna Græcia to the order of some dignitary in honor of the twin gods — or the strolling "philosophers."

That they once stood before the Baths of Constantine and were moved thence to their present position by Sextus V, is shown by the inscription, which reads:

"Sextus V Pont. Max. colossea hæc signa temporis vi deformata restituit veteribusque repositis inscriptionibus e proximis Constantianis thermis in Quirinalem arenam transtulit anno salutis MDLXXXIX pontificatus quarto."

The horses are subordinated in scale to the gods in order to do greater homage to the divinities, and the fact that they were intended to be great works of art is shown by each being cut from a single block of marble. Certain portions left originally in the rough and evidently cut away by the restorers — for the horses in particular have been much restored, only the head and a part of the left side of the one assigned to Praxiteles being antique — show, in the opinion of Fogelberg, a Swedish sculptor, that the figures were originally sculptures in high relief and built into some structure, a supposition which is supported by the drill-holes, now filled up with marble, in the shoulder-blades of the figures which were probably made for the insertion of the metal dowels that held them in place.

The accompanying illustrations, one after a sketch by Leonardo da Vinci and the other after a sixteenth-century engraving show the mutilated condition in which the groups existed at that time. The horse here shown is the one now at the right of the spectator, and is known as the work of Praxiteles.



The Dioscuri of the Piazza del Quirinale, Rome.

Well known but not so famous are the groups of Castor and Pollux at the top of the steps leading to the Piazza del Campidoglio or Square of the Capitol, and in the immediate neighborhood of the Marcus Aurelius. These statues are believed to have stood originally either in the theatre of Balbus or in that of Pompey; but they were more or less lost to sight till, in the time of Gregory XIII, they were discovered in the Ghetto and by him removed to their present position in 1579.

The trophies on either side of them are called the trophies of Marius and were removed from niches in the pavilion (*castellum*) built at the termination of an aqueduct.

Monte Cavallo. — The Quirinal Palace, formerly often occupied by the popes in summer, but now the residence of the King of Italy and called the Palazzo Regio, was begun in 1574, by Flaminio Ponzio; continued under Sixtus V and Clement VIII by Fontana, and completed under Paul V by Maderna. It has been called "one of the largest and ugliest buildings extant."

The Dioscuri. — The Dioscuri were Castor and Pollux, sons of Jupiter and Leda and brothers of Helen. They recovered her after she had been carried off by Theseus, joined the expedition of the Argonauts, and fought with Idas and Lynceus. Castor was killed by Idas, whom Jupiter then slew with a flash of lightning. Pollux killed Lynceus and gained permission from Jupiter to join his brother, so that he lived one day among the shades of the under-world and the next among the Gods. Jupiter rewarded their brotherly love by placing them among the stars as *Gemini*, and Neptune so admired their affection for each other that he gave them power over the waves, and they were especially honored by sailors. They were also regarded as patrons of poets, presidents of public games, and inventors of the war-dance. They always rode on magnificent white horses, which were named Cyllaros and Harpagos. One of the most famous temples of the Republic was in their honor, erected out of gratitude for their assistance at the battle of Lake Regillus. On the 15th of July, the Equites visited this temple in a magnificent procession. Three superb marble columns with other fragments of this temple, still stand in the Forum.

Horses of Marly. — At the entrance to the Champs Elysées are the marble

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figures of horse-tamers by Coustou. They were removed in 1794 from the palace at Marly to their present position. During the siege of Paris in 1871 they were dismounted and stored for safety luckily, since during the siege and the commune shot struck the pedestals and would probably have destroyed the statues.

"I stand at the break of day
In the Champs Elysées.
The tremulous shafts of dawning
As they shoot o'er the Tuileries early,
Strike Luxor's cold gray spire,
And wild in the light of the morning
With their marble manes on fire,
Ramp the white horses of Marly." — *John Hay.*

Marly. — The château at Marly, a favorite residence of Louis XIV a few miles from Versailles, was destroyed during the French Revolution.

[To be continued.]

ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

THE GODDARD CHAPEL, TUFTS COLLEGE, COLLEGE HILL, MASS. MR. J. PH. RINN, ARCHITECT, BOSTON, MASS.

[Helio-chrome, issued only with the Imperial Edition.]

GOTHIC TOWERS AND SPIRES, PLATES 22, 23, AND 24. — BEVERLEY MINSTER; LITCHFIELD CATHEDRAL; AND ST. MARY'S, SAFFRON WELDEN, ENGLAND.

[Issued only with the Imperial Edition.]

COMPETITIVE DESIGN FOR A DORMITORY FOR THE UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA, PA. MESSRS. COPE & STEWARDSON, ARCHITECTS, PHILADELPHIA, PA.

THE HORSES OF MARLY, NOW AT THE ENTRANCE TO THE CHAMPS ELYSÉES, PARIS, FRANCE. G. COUSTOU, SCULPTOR.

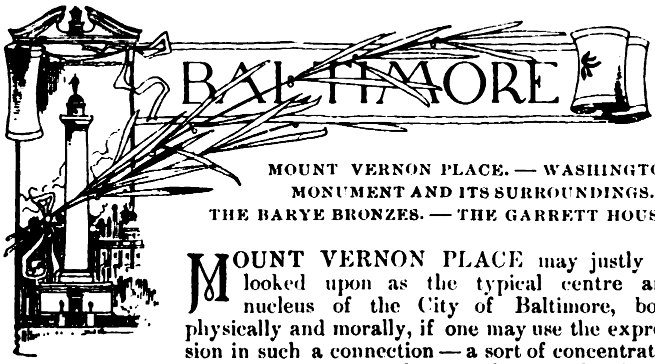
See article on "Equestrian Monuments."

CASTOR AND POLLUX OF THE CAPITOL, ROME, ITALY.

See article on "Equestrian Monuments."

CHILDREN'S WARD OF THE PRESBYTERIAN HOSPITAL, PHILADELPHIA, PA. MESSRS. JOHN MCARTHUR, JR., AND JOHN ORD, ASSOCIATED ARCHITECTS, PHILADELPHIA, PA.

CITIZEN'S BANK BUILDING, FREDERICK, MD. MR. J. A. DEMPWOLF, ARCHITECT, YORK, PA.



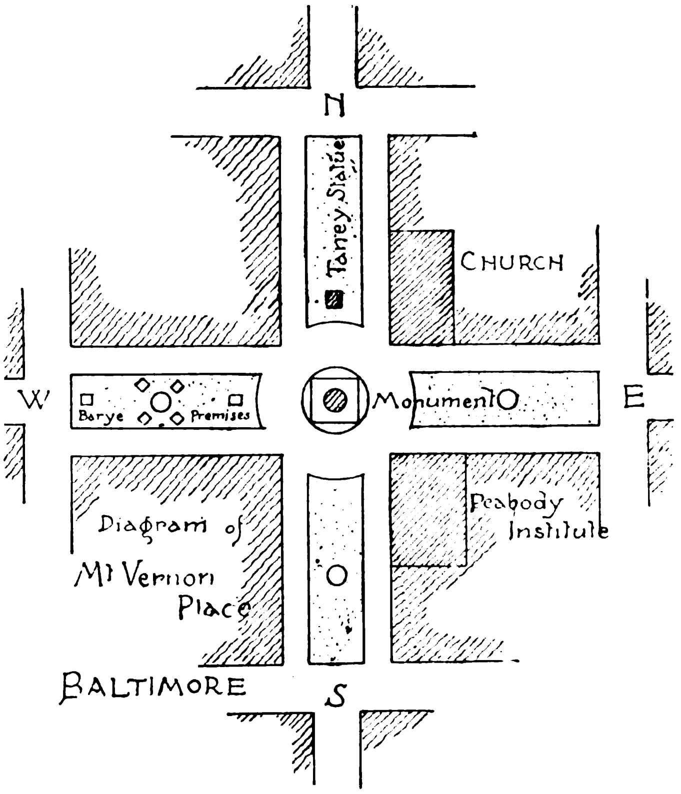
BALTIMORE

MOUNT VERNON PLACE. — WASHINGTON MONUMENT AND ITS SURROUNDINGS.— THE BARYE BRONZES. — THE GARRETT HOUSE.

Mount Vernon Place may justly be looked upon as the typical centre and nucleus of the City of Baltimore, both physically and morally, if one may use the expression in such a connection — a sort of concentrated essence of what is best in both the social and architectural spirit of the city. It is now very near the actual geographical centre, and, having for many years held undisputed sway from a fashionable and aristocratic standpoint, after passing a crisis of imminent danger of downfall, it has in the last few years under a spirit of loyal reaction been substantially redeemed, and once more, and for a long time to come, will continue to be the most prominent social centre also. From its elevated position we may look eastward over one-half of the city, and obtain a very fair idea of its general aspect. Along the broad streets in three other directions one may have a nearer view of very nearly all of the several styles of house architecture that are characteristic of the place, and while we stand there under the shadow of that column which is one of the best bits of architecture in the land, and notwithstanding the much to be regretted lost opportunities, and mistakes of treatment all about us, we are forced to acknowledge that this is by far the most effective and monumental spot in the city, and among the few such to be found anywhere in the United States.

The arrangement is perfectly simple and unstudied. In the centre is the white marble Doric column, some two hundred feet high, on its square base, all enclosed by heavy iron railings of conventional classic form about a circular space of about one hundred feet in diameter, standing at the intersection of two streets, which for the distance of one block due east, west, north and south, broaden out sufficiently to contain a rectangular central space or "parking" of grass plot and shrubbery. To the south and east the ground falls rapidly, giving an extended view bounded by the effective grouping of the great Hopkins Hospital in the distance, while to the west and north the parks are quite level.

For many years these parks were simply enclosed with a low stone curbing, surmounted by a heavy iron railing, similar to the one still surrounding the monument, whose carefully locked gates were only periodically opened for the purpose of raking up the leaves that fell from the stiff rows of trees that stood on the sidewalks, just outside the rail, or to move the very ill-kept sod, that was the only ornamentation the parks could boast of, except when at spasmodic intervals certain generous and æsthetic persons in authority would try the experiment of a few rustic bird-boxes and dwarf evergreens — which being carefully locked up to their own resources soon fell into disrepute and decay and were duly removed to make way for the next feeble inspiration in landscape-gardening. All this



was totally uninteresting and suggestively funereal enough, without doubt, but, barring the bird-box detail, it did possess the merit of repose and a certain consistency of general scheme with the surrounding buildings, broad front dwelling-houses with Classic details — good of their kind in the style of some forty years ago — and the southeast corner occupied by the low and broad white marble Peabody Institute, with its straight cornice-line surmounted by a balustrade; — all the detail of crude Roman Classic to be sure, but the general effect not inharmonious with the monument as a centre. And the final result would not have been unhappy if upon the remaining three corners there had been erected low and broad marble buildings of somewhat similar proportions, and even no better in detail. These buildings might have been applied to various desirable and appropriate uses and a decidedly stately dignity of effect would have been attained, perhaps more so than in any other grouping of our city architecture heretofore attempted.

The first loudly discordant note was struck when on one of these corners was erected in so-called Gothic, built of several different colors of green and brown stone, the Methodist Church, a building that has not failed to obtain quite laudatory newspaper commendation, but which has acquired no impressive effect from either dimensions or proportions, and whose details are only florid ornamentation with a rather frivolous spire, not too bad in itself, but which never fails to impress one with the idea of presumption in standing so near the severe dignity of the noble marble shaft.

Very soon after the erection of this building, followed in rapid succession the reconstructions of the four "parkings"; the high iron rails, uneven sidewalks, and overgrown straggling trees were removed, the last action (as to the trees) calling forth a large amount of remonstrance from the public, accompanied by sentimental reminiscences and even tears; but all such disapprobation should now be entirely dispelled by the replacing of the trees in appropriate varieties and properly spaced. So far so good, in the progress of improvement. One would think that the key-note of suggestion was so

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clearly and strongly given for the whole scheme of landscape gardening and architectural details to be applied to these four simple rectangular spaces — some two hundred and fifty feet long and about fifty wide — by the overpowering influence of the monument, as it stands the crowning feature of each — approached from any direction — that it would have been difficult to go astray. A man whose artistic training in that line had been of the French school, would probably not have hesitated a moment. The situation seemed most distinctly to call for a total abandonment of the "picturesque" and the closest adherence to the "monumental" (the "conventional" if you will), with copings and parapets and terrace steps and balustrades uniformly of granite or white marble, and the designs for fountain, or lamp, or pedestal of the purest Classic detail. What has been done is in a different spirit. The spaces have generally been laid off in curved and wandering forms of grass-plot and pathway, so large in scheme that the design is lost before one can grasp it. The rather fantastic forms of copings and parapets are formed of as many as five different kinds and colors of stone and concrete preparations, while the smaller details of iron lamps and railings would be more appropriately placed as part of the decoration of a "Café chantante"; and even the brilliant masses of flowers set into the well-kept turf and changed with alternating seasons, however charming as a detail in itself, do not perhaps add to the general harmony of the whole, where the many parts already have so little sympathy with each other.

While the south and east parks contain no other details worthy of comment, we may turn to those on the north and west and find there certain special features of interest in the various bronze groups lately given to the city by Baltimore's conspicuous art-patron, Mr. W. T. Walters, and while we may not be willing to abandon all criticism at this point we cannot but recognize with pleasure and gratitude the disinterested generosity, public spirit and artistic impulse that prompted these gifts, so far outstripping, from the point of view of art, anything of the kind that has yet been done in our city; and we may safely assume that Mr. Walters is himself too much of an artist in feeling not to recognize the fact of how rarely — very rarely — such things are accomplished with absolutely perfect and satisfactory results, or to object to criticism made with full appreciation of the difficulties that stand in the way.

The last of these gifts, presented to the city some months ago and the most conspicuous in size, is the statue of the late Chief Justice Taney, an exact reproduction of the bronze a short time previously placed in the State-House grounds at Annapolis from the original of the sculptor, Rhinehardt, a plaster cast of which also stands in the gallery of the Peabody Institute. Rhinehardt, as well as Judge Taney himself, was a Marylander, and Baltimore was, at different times, the home of both, but, never having seen the Chief Justice in life, the artist was forced to depend on photography as his only means of producing a portrait. While the more intimate friends of Judge Taney are not unanimous in their opinion as to the faithfulness of the likeness, the general effect of pose in the sitting figure, naturally and gracefully draped in the voluminous folds of his robe of office, has something in it of repose and dignity that is very satisfactory and typical of an ideal Chief Justice. The statue is colossal and raised upon a rectangular granite pedestal, unfortunate in the very commonplace and heavy projecting mouldings at the top that detract from the scale and detail of the bronze and have no *raison d'être*.

In the middle of the west park is a large circular basin with granite coping, at the centre of which low and closely-massed water-jets spring from the conventional cat-tail and lily-pad design. Around this basin, but at some distance from it, on the diagonal axes, are placed the four bronze reproductions of the Barye groups on the Louvre, "Peace," "War," "Force" and "Order," considerably reduced from the size of the originals, though quite large enough to be very interesting bronzes in themselves, — but so disposed as to form no part of the design of the fountain, — and standing thus isolated they become somewhat insignificant in themselves. If they had been massed nearer the centre and made to form a part of a general scheme of fountain decoration, with the lamps etc., (which are now utterly insignificant), the arrangement could not have failed to be more satisfactory than at present. At the extreme east and west ends of this park respectively stand, quite isolated on their own pedestals, Barye's sitting Lion — typical of brute force in repose, and Dubois's "Warrior" as a "pendant," suggesting human force in repose, not the less beautiful perhaps from the suggestion it presents of close inspiration from Michael Angelo's Medici, "the Penseroso." All these bronzes stand on granite pedestals, in form severe to the limit of crudeness, with the same defect noticed in the Taney pedestal of heavy projecting cap mouldings, which in these smaller groups was so obtrusive that they were considerably reduced after being placed in position. The rather surprising fault has been committed of placing a bas-relief on a much diminished scale, of another of Barye's lions as a panel in the pedestal that supports the big animal, so that we have the result, usually to be avoided, of groups of sculpture of both man and beast to five different scales in the narrow limits of the one park, and closely associated with each other.

Also, the pedestals and the casts seem scarcely to belong to each other. The lower portion of each cast being merely an irregular mass of bronze, forming part of the detail of the group, not resting naturally upon the granite, and needing the addition of a lower rectangular bronze plinth as a base.

Fronting on this same west park is the broad façade of the Robert Garrett house; a very architectural though not strikingly interesting piece of work, by McKim, Meade and White; but quite famous on account of its legal controvesy with its next-door neighbor; — and but a few steps from it is the very modest front of Mr. Walters's own house where, whoever passes under its small Classic portico with the anticipation of keen artistic enjoyment in the treasures of its interior, will surely not be disappointed.

In the immediate vicinity have also lately been erected several of the most pretentious and expensive houses that have been built in the last few years, but whose architectural merits scarcely call for any special criticism.

THE NEWBERRY REFERENCE-LIBRARY. — STRENGTHENING THE BOARD OF TRADE BUILDING. — THE WORK OF THE LOAN AND BUILDING ASSOCIATIONS.

FOR several years past the people of Chicago have been looking forward to the time when a commencement should be made up on a collection of reference-books, which promises to be among the very finest in this or any other country. A sum amounting to something like two and a quarter millions of dollars, bequeathed for the purpose of a reference-library by a late citizen of Chicago named Newberry, has been in the hands of a board of trustees for some time. All the city papers have at various time (noticeably when more interesting subject-matter was wanting) lashed themselves into states of great frenzy because the Newberry Library — as it is to be called — was not pushed and everything done in a minute. The trustees, however, have apparently been slowly, surely, and it would appear wisely working all the time with a definite aim and end in view, so that at length the public now begins to see the first results of this labor. The trustees commenced by selecting as librarian the eminent Mr. William F. Poole, who besides making himself widely known by work strictly in his own line, has also interested himself deeply in library construction and written one or two pamphlets upon that subject — publications that attacted more than ordinary attention. Since the appointment of Mr. Poole as librarian the collection of books has commenced, though upon a somewhat limited scale, and now the volumes already purchased are temporarily housed in buildings directly opposite the square which is eventually to be used as the permanent home of the library.

For over a year the members of the architectual profession have known that the trustees were liable at any moment to appoint an architect for the new edifice which they intend shall be the most perfect building of its kind yet erected. Very wisely it was decided that competitions were, above all things, to be avoided, and that in order to have a satisfactory library, the trustees and librarian would have to work out their problem in conjunction with an architect in whom they should have perfect confidence. Although a decision was reached sometime ago, it is only since the last Chicago letter that the name of this architect has been made public. Mr. H. I. Cobb, of the present firm of Cobb & Frost, is the gentleman selected for this important task. Mr. Cobb retires from the firm and for one year devotes himself exclusively to this building: a portion of his time to be spent in travel both in this country and in Europe, visiting all libraries of importance.

The ground selected for the location of this important building is one entire square which, it is expected, will eventually be completely covered by the edifice. At present, however, only one wing (if it may so be called) is to be built and it is expected that this will afford sufficient accommodation for the collections that shall be made during the next score of years, thereafter additions will be made as the needs of the library may require. The profession will await with some curiosity for a sight of the accepted plans, since the librarian has ideas of his own on this subject which are totally at variance with the accepted usages; in fact, if his conceptions are followed out as a basis of general arrangement, it will be a veritable revolution in library building. And yet his general plans after much opposition have at length received the support of the principal librarians of the country.

The air is again full of rumors about the Board of Trade Building. One has it that the tower is to be pulled down, another, that the entire building is to be razed to the ground, etc. The fact seems to be that a portion of the building will probably be held up on screws and the foundations strengthened. Such a very common proceeding as this, where we are always having something really remarkable going on in the way of raising or holding buildings, would ordinarily pass almost unnoticed, but in this case we are being treated to a more than usually wordy discussion, and this time, unhappily, it is stirring up bad blood amongst the architects. Unfortunately, the tower of the building was not built quite plumb, and certain parts of

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the building have settled more than was anticipated. These and several other things taken together have given the friends of certain architects (who hoped originally to build the building) a chance to call upon these same architects for opinions, which, apparently, they have hastened to give not only to members of the Board of Trade, but to every one in general, and that in a most self-laudatory manner and seemingly quite forgetful of all professional etiquette. They criticise not only the condition of the building itself, but also the architect, the old building-committee and everybody in general who did not originally favor their plans. Naturally, the architect feels greatly stirred up, and he, in his turn, forgets professional dignity, and writes an open letter to one of the daily papers, wherein he mentions no names but gives a most cutting reply, illustrating his point that those who live in glass-houses ought not to throw stones, by some examples more forcible than dignified. It is to be hoped that this will end the affair, which is more than usually to be regretted owing to the fact that all the parties are members of the American Institute of Architects, which is supposed to represent the best elements of the profession. At any rate, it is to be hoped that they will not consider it necessary to wash any more of their dirty linen in public.

Some agitation has lately been aroused relative to the advisability of placing the Loan and Building Associations here under some supervision of state officials, and thereby, if possible, more effectually guarding the interests of the shareholders. Owing to this agitation some very remarkable statistics have been published, whereby it is shown the enormous number of people who are connected with these saving institutions and the vast interests that are at stake. There are now said to be in running shape and flourishing condition over one hundred of these societies in the city of Chicago alone, and the suburbs are full of them. During one month, ending June 25 last, 229 mortgages were recorded by building-associations, while the sums loaned reached the surprising aggregate of $385,000. This would bring the annual total to nearly $5,000,000, which, it is said, will probably be exceeded this year. This, at the average loan of $1,250, means about 4,000 builders of homes who are furnished with capital, while the whole sum of $5,000,000 represents the earnings of nearly 60,000 families. Such a vast number of people as this implies is a great surprise to most persons, although it was in a general way recognized as a fact that large numbers were interested in these institutions. This showing of home-builders is one of the most gratifying exhibits of the building-department this year, and when good citizens think of the Haymarket riot they are duly thankful to see that by the building-associations alone 4,000 families are annually being turned into capitalists, whose interests are to suppress lawlessness and anarchy, and so help see that order is preserved and the laws justly enforced.

THE METROPOLITAN BOARD-OF-WORKS SCANDAL. — LIMITING THE HEIGHT OF BUILDINGS. — RESPONSIBILITY OF AN OFFICIAL ARCHITECT. — THE ITALIAN EXHIBITION. — THE GOVERNMENT SCHOOL OF ARTS PRIZES. — THE LIVERPOOL CATHEDRAL SCHEME.

I HAVE from time to time let drop hints as to the existence of grave scandals in connection with the Metropolitan Board of Works. Rumors of a very disquieting character had been flying about London till at last Parliament appointed a Royal Commission to inquire into the whole matter, and see if these unpleasant rumors had any foundation in fact. The inquiry is now being held, and to quote the words of the noble lord, the Chairman of the Board, "is proving painfully successful."

London — this huge, ungainly, overgrown metropolis of England — has for many years labored under a considerable disadvantage with regard to its government. It is too large to be grouped together under one municipal authority, as are our other large towns, therefore recourse has been had to what are termed the vestries. These vestries are, in reality, the parochial councils of the various parishes of London, but with somewhat enlarged powers. The functions of these vestries or district boards-of-works — for they are called by either title — are various. The collection of the rates, the maintenance of the roads, the efficient lighting and drainage of the district, and various questions of sanitation and medical inspection form part of their duties — indeed, they are closely analogous to such bodies as local boards-of-health and urban sanitary authorities. The jurisdiction of each vestry, however, is confined within its own boundaries, and, therefore, it was found necessary to form a central authority which should take up and discharge those duties which the vestries were unable to perform. Each vestry, therefore, elected one or more of its members to form part of this central executive body, which was termed the Metropolitan Board of Works. As time passed on fresh duties were continually given to this Metropolitan Board until at the present time, there is no municipal body in England at all approaching it in power. It has the control of revenues exceeding those of some of the small Continental kingdoms. To it is entrusted the execution of many Acts of Parliament. It examines our theatres and controls our fire-brigade. Under the Artisans'-Dwellings Act, it can, by a single resolution, depopulate and raze to the ground large tracts of our most densely populated districts. It can also, if it thinks fit, cut new streets right through the centre of London, acquiring the necessary land by compulsory purchase. Vast engineering works, as for instance, bridges, sewage-outfalls and such works as the Thames Embankment, come within its domain. It controls our parks, determines our building-lines, appoints our district surveyors, in fact, it is difficult to say where its powers end.

It will at once be seen what a power for evil this body would become if it exercised its functions in an unjust or partial manner. Indeed, as one of our great daily papers recently observed, architects, surveyors, builders, etc., wait on its very nod, for with one stroke of the pen it can make or mar their fortunes.

With this preface, it will be at once understood what a sensation the revelations before the Royal Commission have made. The whole Board seems infested with bribery and corruption of the very worst kind. First one official, then another is implicated, wholesale intimidation is revealed, and now even some of the members — whose conduct should surely be above suspicion — are shown up before the public in a light the reverse of pleasant.

Worst of all, it is in the Architects' Department that all these delinquencies are being discovered. The arch-offender was a Mr. Robertson, Chief of the Department, which supervised the letting and sale of sites. This *modus operandi* seems to have been this: Robertson, of course, was aware of the sites which were about to be let, and he kindly kept his friends outside the Board informed as to those which were particularly eligible. He was also obliging enough to let them know the lowest price the Board would take, and suggested that if they made a certain offer he would advise the Board to close with the offer. The Board usually did so, and consequently Mr. Robertson's friend was fortunate enough to get the coveted site many hundreds of pounds cheaper than he would have done in open competition. Of course, it would be only the proper thing to recognize Robertson's kindness by a little present, and a small cheque, therefore, generally found its way into Robertson's hands. It has been calculated that these small cheques have amounted to many thousands of pounds. Since the appointment of this Royal Commission Mr. Robertson has thought it prudent to place the seas between himself and his old business haunts.

Another official — one of those gentlemen who evidently combine the *suaviter in modo* with the *fortiter in re* — who has been in the employ of the Board for, I believe, twenty-seven years, has proved as clever as Mr. Robertson. His son, evidently a chip of the old block, whose duty it was to supervise the letting of the Board's public houses, sorrowfully admitted that, during his tenure of office, one tenant had actually obtained a lease without bribing him.

I could go on telling you such stories for many a long page. I could tell you how plans were delayed on every possible excuse, if the official palms were not greased; I could show you how every conceivable obstacle was placed in the way of those who wished to do business in an honest way; I could tell you of many instances of members using their position for their own pecuniary advantage, but I refrain.

It is hard, no doubt, for those members who have managed to keep their hands clean in this slough of despond. The public is very apt to judge the whole by the actions of some, and in its anger to condemn unheard those whose record is unsullied. All honor be to those who have kept themselves clear, but I very much fear that the somewhat cynical proverb, "Virtue is its own reward," will be found applicable in this case.

With one characteristic anecdote I will leave this subject. A Mr. Villiers was about to erect a large music-hall in Piccadilly Circus. He accordingly went to an eminent and highly honored firm of architects — Messrs. Isaacs & Florence — and appointed them his professional advisers on one condition, viz., that they should find some builders who would be prepared to carry out the whole of the works, reserving payment till the conclusion. Mr. Isaacs explained that the condition was a somewhat hard one, but he would do his best. He tried and succeeded, and accordingly proceeded with the plans.

Things went merry as a marriage-bell until sometime after Mr. Isaacs's appointment, Mr. Villiers received an intimation from a certain quarter that if he wished his plans passed quickly, he had better go and see a certain architect, a member of the Board: otherwise very considerable delay might ensue. To Mr. Villiers time was money, and consequently an interview was arranged between this member and himself. The member was quite surprised to see him, but thought he might possibly undertake the work. "But," objected Mr. Villiers, "You cannot vote upon your own plans at the Board." "No," replied this architect-member; but, he added, with a shrug of his shoulders, "There are other ways of killing a cat besides hanging him." Mr. Villiers perfectly understood, and this member was duly appointed architect to the building. The matter was explained to Messrs. Isaacs & Florence, who did not, however, quite acquiesce in the arrangement, and brought an action against Villiers. This was ultimately settled by Mr. Villiers paying

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£100 as compensation to his old architects, which £100 was repaid to Mr. Villiers by his new architect member of the Board, and the plans were duly passed. This member is a Fellow of the Royal Institute of British Architects, an Alderman and Magistrate of the city of London, a Fellow of the Society of Antiquaries and of the Royal Geographical Society, and an aspirant for a seat in Parliament. I am afraid that now he will not succeed either in filling the Lord Mayor's chair or in getting into Parliament. His conduct in this and other matters is hardly appreciated either by his fellow-aldermen or by the Royal Institute of British Architects, whose Council have, in fact, applied to the Royal Commissioners for an official copy of the evidence with an obvious purpose.

We have had another little outcry about high buildings. This time it was sought to extend those enormous edifices, termed Queen Anne's Mansions, near St. James's Park Station. Certainly their extension would be no great addition to London's architecture, for a duller and more lifeless elevation can scarcely be imagined. The public, however, seem determined to have no more high buildings, for a bill has been introduced into Parliament for the purpose of limiting their height proportionately to the width of the street. Some such regulation is certainly needed, as there is now no restriction at all upon the height of buildings.

An interesting law case is promised us in connection with the London School Board and their late architect, Mr. E. R. Robson, F. S. A., now, I believe, the consulting architect to the Education Department. Immediately after the passing of the Education Act, a large number of elementary, or board schools as we call them, were erected all over London. It was notorious at the time that the contracts were rather "cut fine," but some recent excavations at a school at Ratcliffe Highway disclosed the fact that the concrete foundations were extremely defective, so much so in fact as to have threatened serious damage to the school. This bad work was, therefore, as soon as possible removed and replaced by better; but now the School Board have passed a resolution stating that the architect is personally responsible for the damage caused by this bad work, and have instructed their solicitor to take action against him. Mr. Robson's contention is that an architect is not personally pecuniarily responsible for inferior work, and that, moreover, the immense number of buildings whose erection he had to simultaneously superintend made it absolutely impossible for him to be responsible for the quality of each individual brick or hod of mortar. It will be interesting to watch the progress of this case.

In speaking of the Italian Exhibition which is now being held at Earl's Court, I should like, first, to congratulate the Director-General, Mr. J. R. Whitley, upon the great success he has achieved in his enterprise, which is the more remarkable seeing that he has not been subsidized or even received moral support from the Government. The *Nineteenth Century*, referring to the American Exhibition held on the same site last year, asked: "When was ever such an exhibition held in a foreign country, without Government assistance, by any other nation in the whole annals of the world?" And I consider the Italian Exhibition more complete and representative than the American.

The first thing that strikes one in a careful survey of the industrial products of modern Italy is the artistic feeling which has been displayed in their manufacture. The artificer seems to have been imbued with a desire to carry out his work in an attractive manner altogether different in spirit from the mechanical, lifeless article that we are unfortunately too accustomed to see in England. Indeed, the national Italian character seems thoroughly displayed in these works, and unluckily, their bad points are to be seen as well as their good ones. We find symptoms of unrest and a desire, so to speak, to attract more than to please. The same spirit which animated Bernini and Borromini in their eccentric and unhappy vagaries seems but too apparent in the modern Italian school, and they seem unable to grasp the fact that there is a beauty and grandeur to be found in a simple, even if severe work, for which no amount of roccoco ornament or artistic eccentricity will form an adequate substitute.

Precisely the same feeling can be traced in the pictures and sculpture. Here we find that modern Italian painting is impressionist to a degree. Mr. Martin, in an interesting preface to the catalogue, is evidently quite aware what line the criticisms on the pictures will take, for, referring more particularly to the productions of the modern Milanese school, he says: "To the English public the works of Morbelli and Legantini should prove of no small interest as the creation of a new school of what is now-a-days so much misunderstood as 'impressionism.' Whatever may be the criticisms to which the works of these artists are open, here, at least, we have the genuine expression of the painter, the 'impression' of the scene which presented itself to his eye as he sat down, brush in hand, to transfer to the canvas his impression of nature. Approached in the spirit of prejudice which too often influences us all in our appreciation of works of art, it is not difficult to imagine that the works displayed in the several rooms devoted to the Milanese artists will meet with some degree of severe criticism, but judged from the standpoint of genuine art, these twenty or thirty canvasses are worthy of much reverence if only on the score of the genuine and unborrowed individuality with which they are stamped." A clever apology, but an apology all the same, and one which, I am afraid, will not suffice to convince the art-appreciative public. One plea of Mr. Martin's deserves more than a passing notice, and that is where he dwells on the individuality of modern Italian art. This is certainly one of the most striking features of this exhibition, for the vacillating and dependent character of Italian art during the last century seems likely to be replaced by something original, which may ultimately develop into a really interesting school.

There are over a thousand pictures exhibited, but it is difficult to account for the honor bestowed upon a considerable proportion. Unless it was the intention of the hanging-committee to provide us with assorted specimens, good and otherwise, they might with advantage have reduced their collection by two-thirds, and gone in for quality rather than quantity. Still, some of the pictures are painted with great force and vigor. I was struck particularly with Joris's "Flight of Pope Eugenio IV," and two pictures by Jacovacci and Cammarano, lent by His Majesty the King of Italy, are worthy of a place in any gallery. A very powerful picture is one of Natale Attanasio's, representing some mad girls in chapel, and two huge canvasses depicting ancient Classical scenes are painted with a care unusual in pictures of so large a size.

The sculpture is open to the same criticisms as the industrial art and the paintings, and there are very few really good examples of earnest work. In the majority of instances too much attention seems to have been paid to details to the detriment of the works as a whole. Still, some of the examples are remarkably quaint and will doubtless please the taste of the exhibition sight-seers. An interesting feature of the exhibition is a reproduction of the Colosseum of the exact dimensions of the original. Here a display is given of the old Roman games. Altogether the exhibition cannot but prove beneficial to both the Italian and English nations.

I went into South Kensington Museum this afternoon to see the Exhibition of the Prize Works of the Government Schools of Art. This is very interesting, more especially as regards the industrial art. Designs for lace, ironwork, tiles, wall-papers, carpets, etc., are all exhibited, and it certainly behooves the Government to foster these mechanical arts possibly to a greater extent than the pure arts of painting, sculpture and perhaps architecture.

The architectural works were very unsatisfactory, and as I walked up and down the screen upon which they were hung, I doubted very much whether the Government is really conferring any benefit at all upon the country at large or the profession in particular by offering the prizes that it does. With the exception of a set of measured drawings that had previously done duty at the Royal Institute of British Architects and a design for a cathedral, I do not think a single one of the exhibited drawings would have stood the least chance at one of the Royal Institute of British Architects or Academy competitions, and it is quite clear that the first-class men are not attracted by this competition. There is no doubt whatever that the funds used in the National Competition might be employed to much better purpose if used for purposes of instruction rather than for prizes. It does seem to me to be such a pity that the great establishments for architectural education do not combine their forces and set this matter once for all on a firm basis. Take, for instance, what is, I am sure, destined to become, some day, our English Ecole des Beaux-Arts, the Architectural Association. Although this school does so great and so valued a work, and although nearly all our architects of the present day have received their education there, yet it gets really no help at all from extraneous sources, with the exception possibly of the Royal Institute of British Architects.

Again, the Academy holds itself quite aloof from the other architectural bodies, and the Government Schools of Art are very little in sympathy with either the Association or the Academy. Yet if these three institutions and the Royal Institute of British Architects were to join hands and work together for the good of the profession as a whole, the result would be extremely satisfactory to all concerned, and England would possess an architectural school second to none.

I am indebted to the *British Architect* for reminding me, with regard to the Liverpool Cathedral Competition, that the committee never actually selected Mr. Emerson's designs. This is, I believe, the case, but it will be remembered that Mr. Christian, the assessor, in his report summed up strongly in favor of Mr. Emerson's design, and it was pretty generally understood to the profession that his designs would be adopted. The point, however, that I wished to lay particular stress on was the childishness of having a competition for the design of the proposed cathedral before a considerable proportion of the required funds were either in hand or in prospect. I hear, now, that the idea of building a cathedral has been definitely abandoned for the present, owing to the extreme difficulty in raising enough subscriptions.

CHIEL.

SILVER BELL METAL. — It has long been thought an excellent thing to mix silver with the other metal when a bell was to be cast, says the *New York Sun*, and many pious persons have rejoiced at the thought that the silvery chime of the bell was in part due to their gifts. Now comes a writer in an English scientific paper with this paragraph: "I once asked a foreman in a well-known bell foundry whether putting silver in a melting-pot was of advantage. He replied, of great advantage — to the founder, as the silver sinks to the bottom; the founder pours off the copper and tin, and when the silver has cooled, puts it in his pocket."

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NOTES AND CLIPPINGS

A National Reservation on the Rio Grande. — The propriety of a bill introduced a day or two ago by Chairman Holman, of the committee on public lands, into the United States House of Representatives, to set aside a large tract of land near Cochite, on the Rio Grande, in New Mexico, as a national reservation, on account of its many archæological remains, was illustrated and confirmed by the Honorable Amada Chavez, one of the leading citizens of the territory who lives not far from that section of country. He discovered a short time ago, one mile north of the little town of San Maeto, the ruins of an extensive city, the existence of which had never even been suspected before. The action of the wind had covered the larger portion of the ruins with sand and other detritus, and converted the whole into an extensive mound; and it was only a severe rainstorm and cloudburst, sweeping away one angle of this mound and disclosing some heavy stone walls that made the discovery possible. Mr. Chavez has since uncovered one or two of the ruins and obtained a number of interesting relics A skeleton was found having three strands of beads around its neck — one of turquoise, one of jet and the other of bone. There were also large ear-rings of jet and turquoise with the skeleton and remains of the hair, which was not black, but light brown, besides ornamental pottery and arrow-heads, with a quantity of maize, partly carbonized. This skeleton with the articles enumerated, was found in a small chamber of masonry built up with a very adhesive cement. The excavations thus far made have discovered a large building with massive stone walls and a tower at each corner. It looks more like the remains of a citadel than an ordinary dwelling. The masonry is of the best kind, and the interior chambers are plastered and painted white. In the centre of this structure was found a water reservoir, from which stone aqueducts led in many directions. A dim tradition among the native Pueblo Indians located here a prehistoric city named Guato, which was still in existence at the time of Cortez's coming to America. — *St. Louis Globe-Democrat.*

Old Statues for Sale. — The sculptors are rather playing it on this much discovered country. The world is full of Columbus statues, and there being no chance of more commissions in this line an enterprising sculptor worked up the claims of Leif, the son of that old pirate, Eric the Red, as a discoverer of America. Boston and Milwaukee were vaccinated with the Leif virus and invested in statues, which are really beautiful to look upon as works of art. Nobody else going in for Lief statues, Sculptor Story is now engaged in preparing an article on the discovery of America by Jean Cousin of Dieppe, before the landing of Columbus. This rivalry of the discovery claims will doubtless go on until the sculptors have sold off all their old stock to make way for the new styles. There was that Welshman with the hydrophobic name of Madog, who is said to have come over here with a colony in 1170. He will have to be set up in bronze somewhere. And also that John of Rolno, who was a countryman of the gentleman over whose fall Freedom is said to have shrieked — Mr. Kosciusko. This forerunner of ex-Alderman Rudzinski, John of Rolno, is said to have come over here in 1477, some twenty-one years before Columbus's third voyage, so a statue in his memory will probably be set up at the corner of Pulaski and Sobieski streets, in this home of the oppressed of all nations. Nicolo Zeno also should have a show. He sailed from the open sewers of Venice in 1380, and discovered America. This is probably a lie, but it is a good enough story to enable some sculptor to work off an old bust of Ben Butler for a bust of Zeno. — *Milwaukee Sentinel.*

An Old Colonial Mansion. — A correspondent of the Richmond *Dispatch* describes a very old house in Rowan County, three miles from Salisbury:

"This house, from a tablet over the front door, was built by Michael Braun (now spelled Brown) in 1776, and is still owned and occupied by his descendants. The fireplace is eight feet wide, five feet high and five feet deep — sufficiently large to roast an ox, and of sufficient size to contain over a cord of wood. The house is 40 by 30, two stories, and is built of granite obtained near by; windows arched with granite blocks about the size of bricks, laid in mortar, now so strong that it would require a sharp pick and a strong arm to remove it; walls three feet thick; doors and window-facings of black walnut, and the house covered with cypress shingles, which were in such a state of preservation that they have only been removed since 1880. Those shingles must have been wagoned from or near Charleston, South Carolina, 180 to 200 miles. The house was built on the then great travelled road from James River to the Catawba Indians by the trading ford on the Yadkin River. This ford was the home of the Lapona Indians when Lawson, who was sent from England by the proprietors, visited it in 1700.

How Vancouver was built. — A gentleman who arrived in Boston yesterday fresh from Vancouver, the Pacific terminus of the transcontinental railway, gives the genesis of that city in terms which are as startling as they are significant. Two years ago there was but one house in the locality. A year ago there were a dozen straggling log huts. To-day there is a population of 5,000 persons; the Victoria Hotel is one of the finest houses in the country, charging $4 a day and worth it; the main street, built through the virgin forest, as it stood a year ago, is flanked by granite blocks that rest where stumps fifteen feet or more in diameter have been blown out by dynamite; the town is lighted by electricity; there is semi-weekly communication with China and Japan by steamship, and the Canadian Pacific keeps the northernmost city on the Pacific coast in daily communication with the eastern world. All this is substantially a year's work. Other places of this size, or even greater, have sprung up in a night like Jonah's gourd, but it is believed that there is no record on the American continent of the building of a similar town, with all the improvements of modern civilization, within so short a space of time. — *Boston Herald.*

A Magnetic Hook. — A new application of magnetism has been found in connection with a crane for moving steel at the Otis Steel and Iron Works at Cleveland, United States. It consists of an electro-magnet made out of two bars of soft iron fourteen inches long and three inches in diameter, connected at the top by a third bar. Coils of wire are wound upon the magnet, and are connected in a circuit of a dynamo which is used to energize the magnet. The current is shunted out of these coils by the means of a switch, operated by the person directing the movement of the crane. The various magnets used for this purpose have an attractive force of from 150 pounds to 800 pounds, according to the size of the billets of metal required to be carried by the special crane. One peculiar point learned in connection with this magnetic substitute for the ordinary hooks used on cranes, was that the magnet would attract the chain above equally well with the mass below, and lifting chains used on the crane were consequently entangled in the most puzzling snarl until ropes were substituted. It is quite possible that this apparatus affords an excellent field for the brass chain made by the electric-welding process of Professor Elihu Thomson. — *Engineering.*

TRADE SURVEYS

There are signs of a revival of demand in textile products, iron, lumber, petroleum; also signs of an improving demand for our cereal and cotton products. Lumber journals speak of an improving demand in most of the Western and Southern cities. In Chicago, Minneapolis, St. Paul, Omaha and Kansas City the recent building operations have greatly exceeded this time last year. Great activity prevails in the far off towns in the West and South. Considerable activity now prevails in the smaller towns in the New England and Middle States. Under this steady demand stocks of building material have declined. Wholesalers have been slow about permitting stocks to accumulate; within the past week or so a good many wholesalers have concluded that now is a good time to begin to place orders for material to be used during the coming winter. This activity extends to traders in a number of directions. Business men with one set of views say that if the election turns out to suit them, it will result in a great increase of business, while those with opposite views make the same statements for their side. The views will probably manifest themselves in this way that no matter which way the national election goes there will be an improving demand for material. It is evident that there will be a large amount of material needed for mill and shop building in those regions of the country where building can be conducted in cold weather. It is an assured fact, however, that a large amount of railroad-building will be done, for contracts have been placed within a few days for orders to be delivered next year in the Northwest and Southwest. The rolling-stocks on most of our roads are running down and requirements will be large, but leading railroad managers intimate that there will be a general effort made to replace worn-out stock next spring. Railroad managers will restrict expenses within the narrowest limits possible. Most railroads are doing a better business. Net earnings of leading systems, when compared with net earnings of last year, show a falling off, and it is thus a motive of great economy but the resulting effects will be productive for good in the cheapening of the cost of transportation to shippers and the general public, and to railroad stock-holders themselves. According to the best information from reputable railroad authorities throughout the East, it appears to be a reasonable statement to make that there will be a marked increase in railroad-construction. There is not much doing at present, but large future possibilities.

The lumber trade has improved lately in order to cover large requirements in the winter. The prices have been well maintained. White and yellow pine continue in good demand. There has been very little slashing of rates or dumping of stocks on overcrowded markets. A rise for September is probable. The certainty of a rise in the coal trade has stimulated demand to an unusual point, and the weekly production is now about 600,000 tons. The bituminous production which is shipped southward is above last year's production. The iron trade reports very little improvement, but consumers everywhere are withholding all but absolutely urgent demands. Textile manufacturers are slacker than a month ago, but there is a good deal of business doing Boot and shoe manufacturers, though complaining of competition, are still getting out of the position which strikes have put them in during the past two years. The manufacturers of staple hardware are endeavoring to restrict production in order that moderate margins may be maintained. Associations throughout the various industries are most of them in a healthy condition. They have succeeded in advancing prices except in one or two instances, but they are accomplishing more permanently satisfactory results in preventing the gorging of the channels of trade. Production and consumption were never more evenly balanced than now, and traders are complimenting themselves on the accomplishments of these results. The bankers are prompt in their accommodations and money-lenders who loan on mortgages and who purchase stocks and securities are holding back, although the rank and file investments should furnish wool, for the stock manipulators are keeping theirs where it belongs. There is less speculation throughout the United States than has been known for years. Enterprise is more determined and there is more opportunity for good investments than ever. The tables of stock furnished from week to week for financial and commercial manufacturing and mining and in other directions when carefully scanned and compared with reports of former years, furnish the conclusion that the condition of wage-workers is better, that prospects for investment are more encouraging, that manufacturing interests will be more evenly engaged hereafter, even when compared with the booming years of the past. Trade is organizing itself, capital is becoming more conservative, labor is becoming more cautious. The underlying laws which control all are being more clearly observed and obeyed. The great underlying conditions of trade and commerce are being studied by leaders in industry and commerce, and the lessons which are taught are not wasted. Important interests are arising before the people, and when they investigate them, there will be found an underlying intelligence among the masses which will be able to deal wisely with them.

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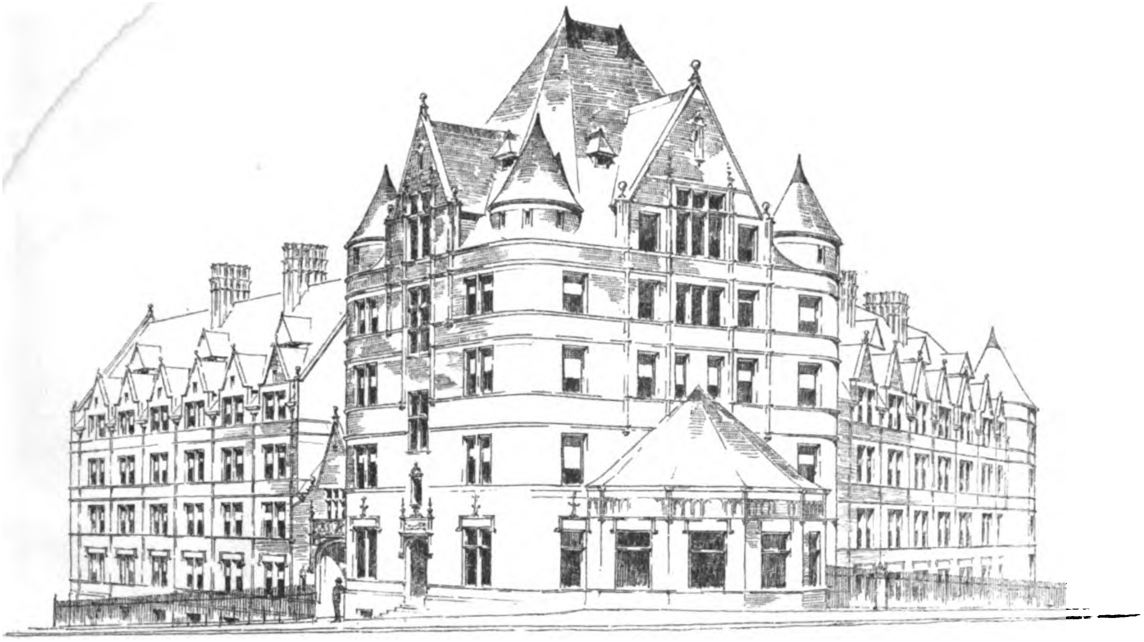

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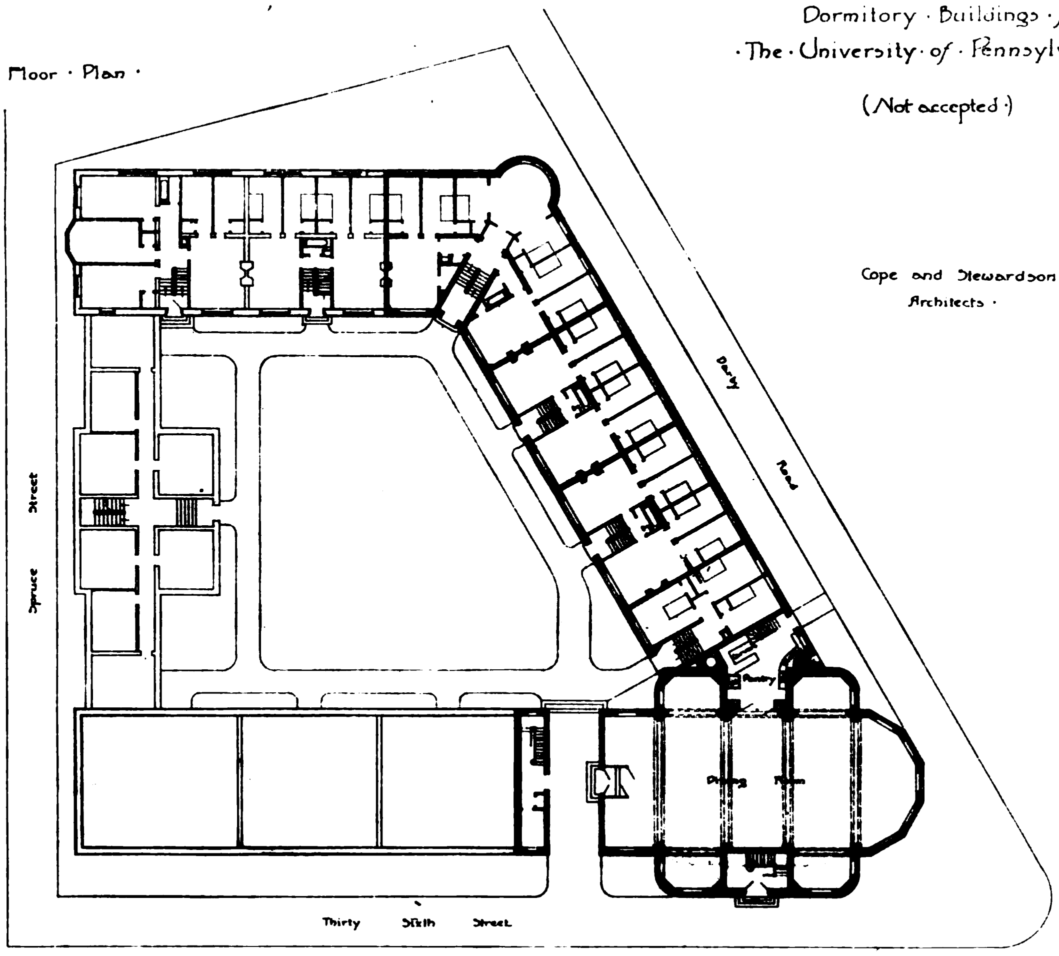

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The Horses of Marly, Paris. Coustou, Sculptor.

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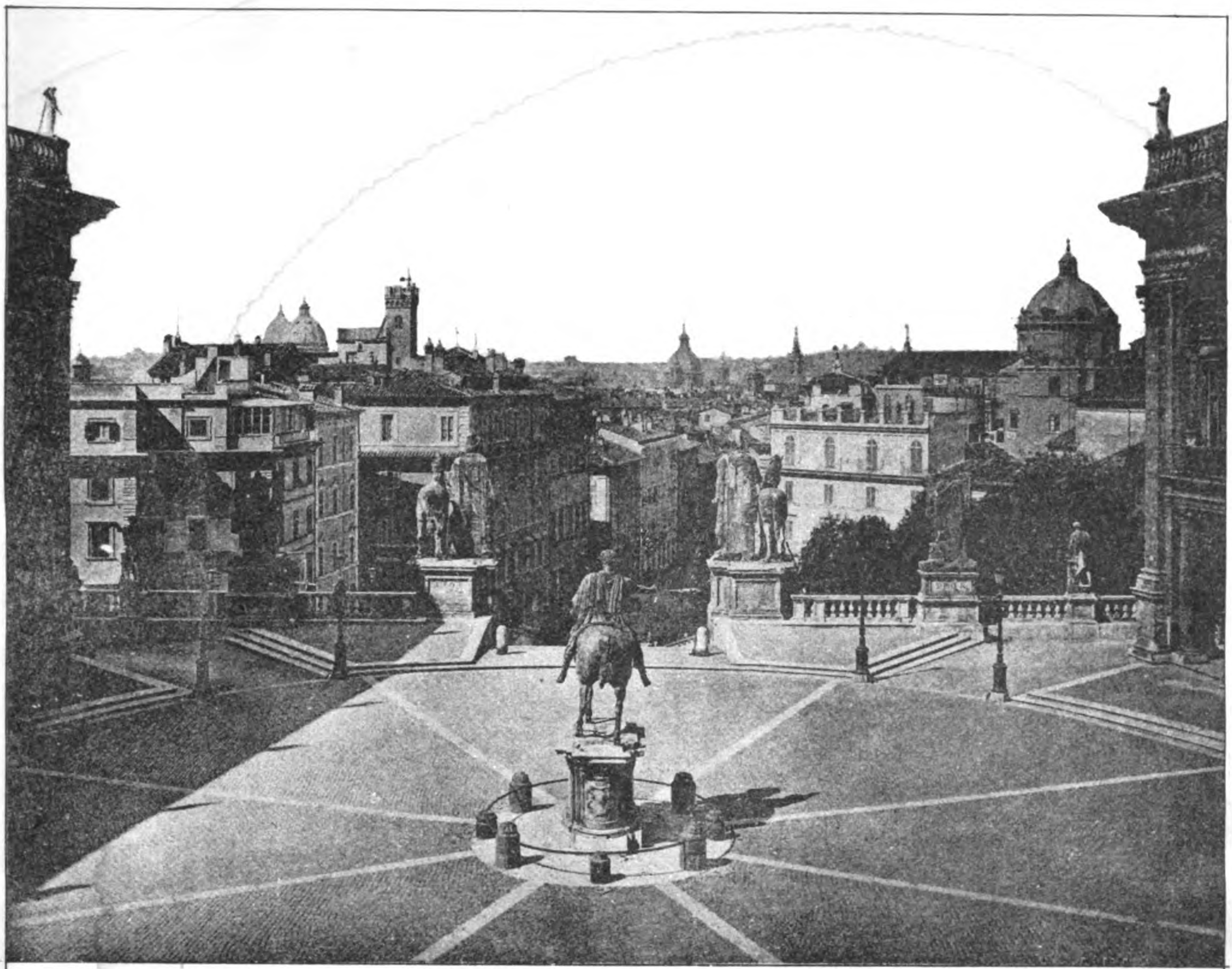

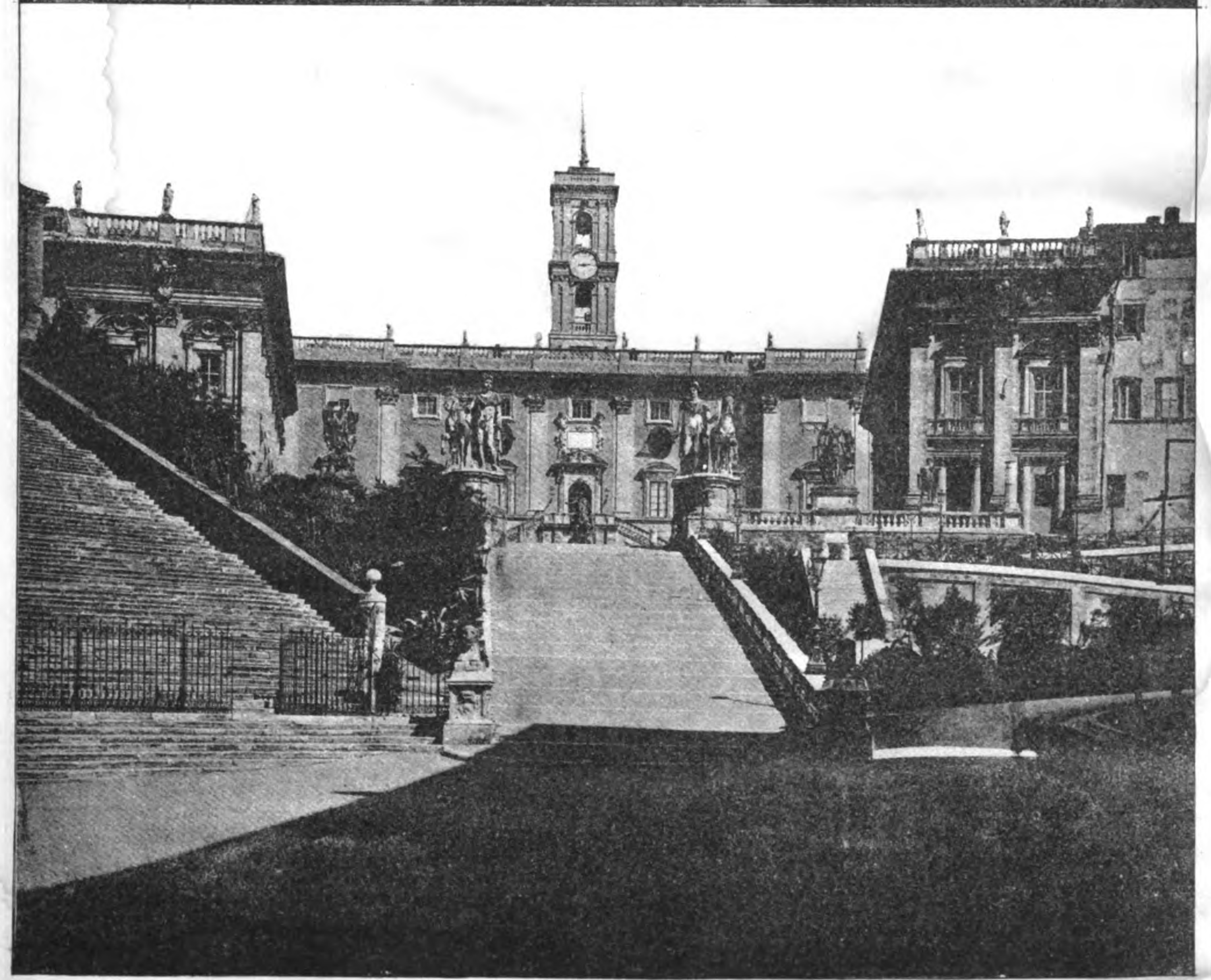

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Castor and Pollux of the Capitol, Rome.

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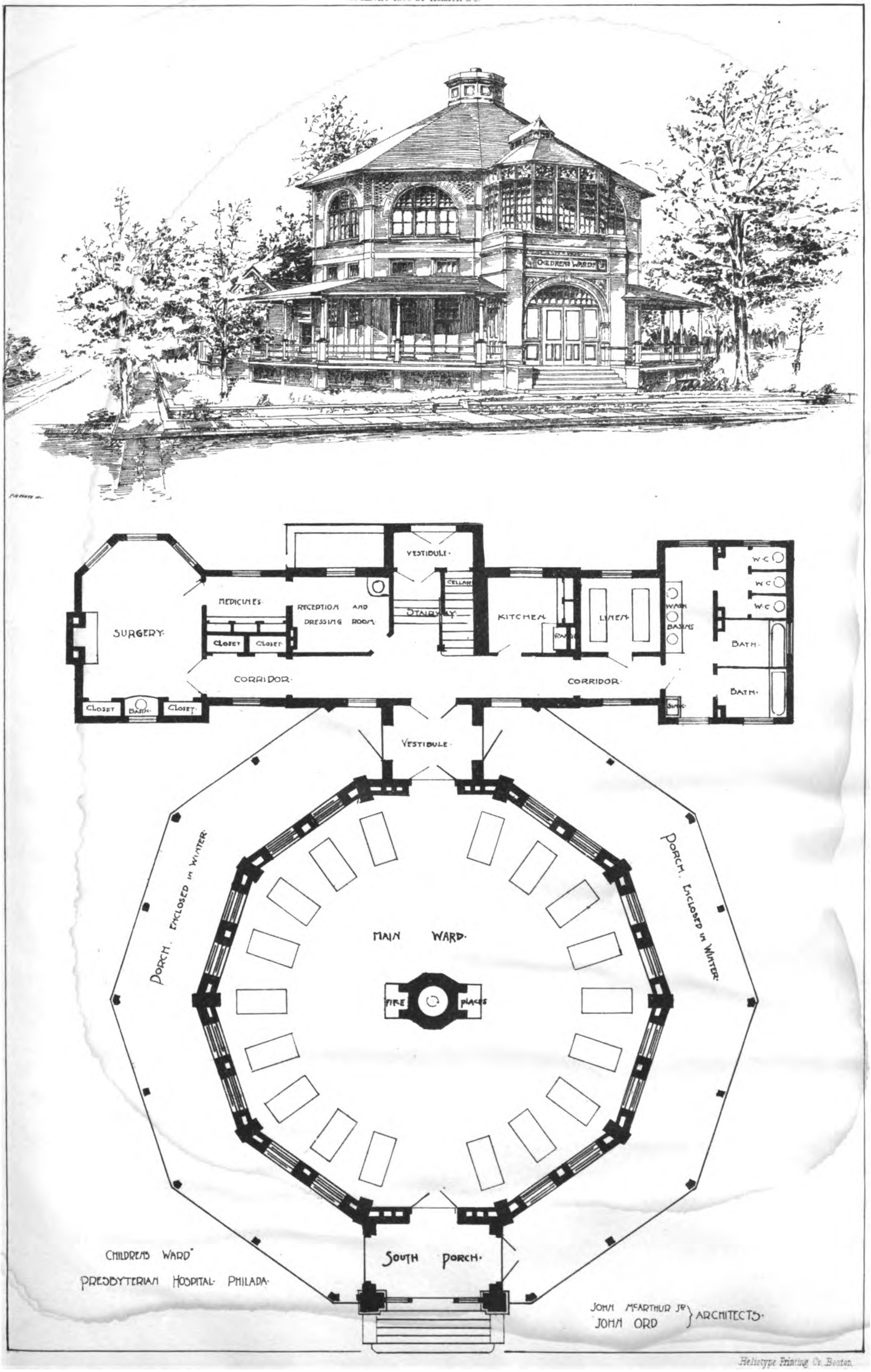

CHILDRENS WARD
PRESBYTERIAN HOSPITAL PHILADA

JOHN McARTHUR Jr.
JOHN ORD
} ARCHITECTS

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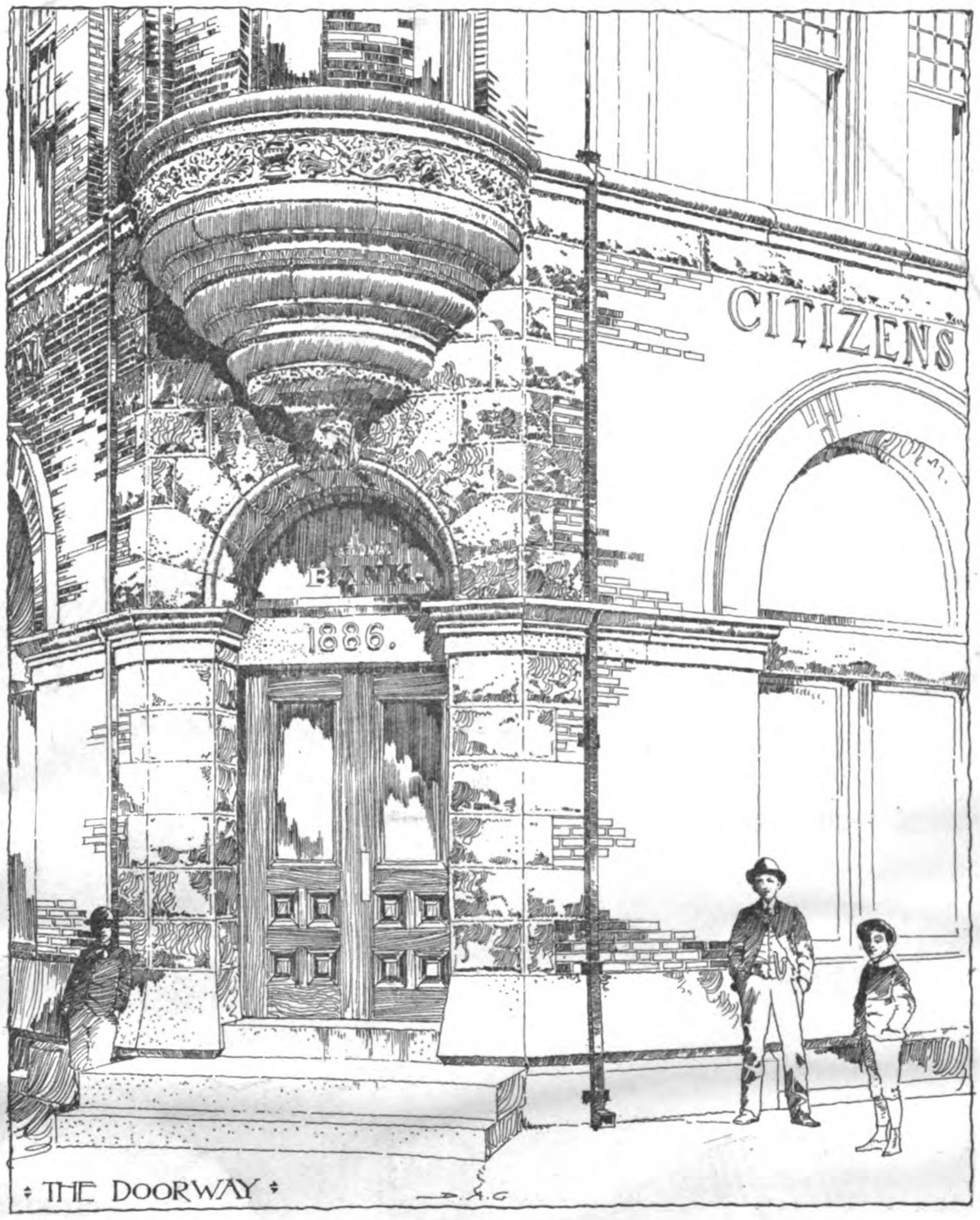

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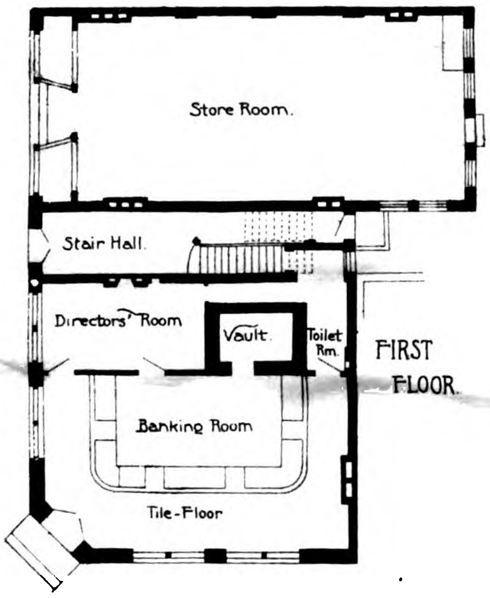

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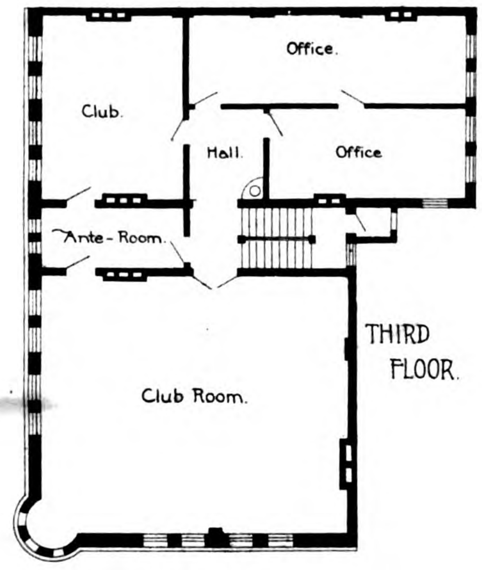

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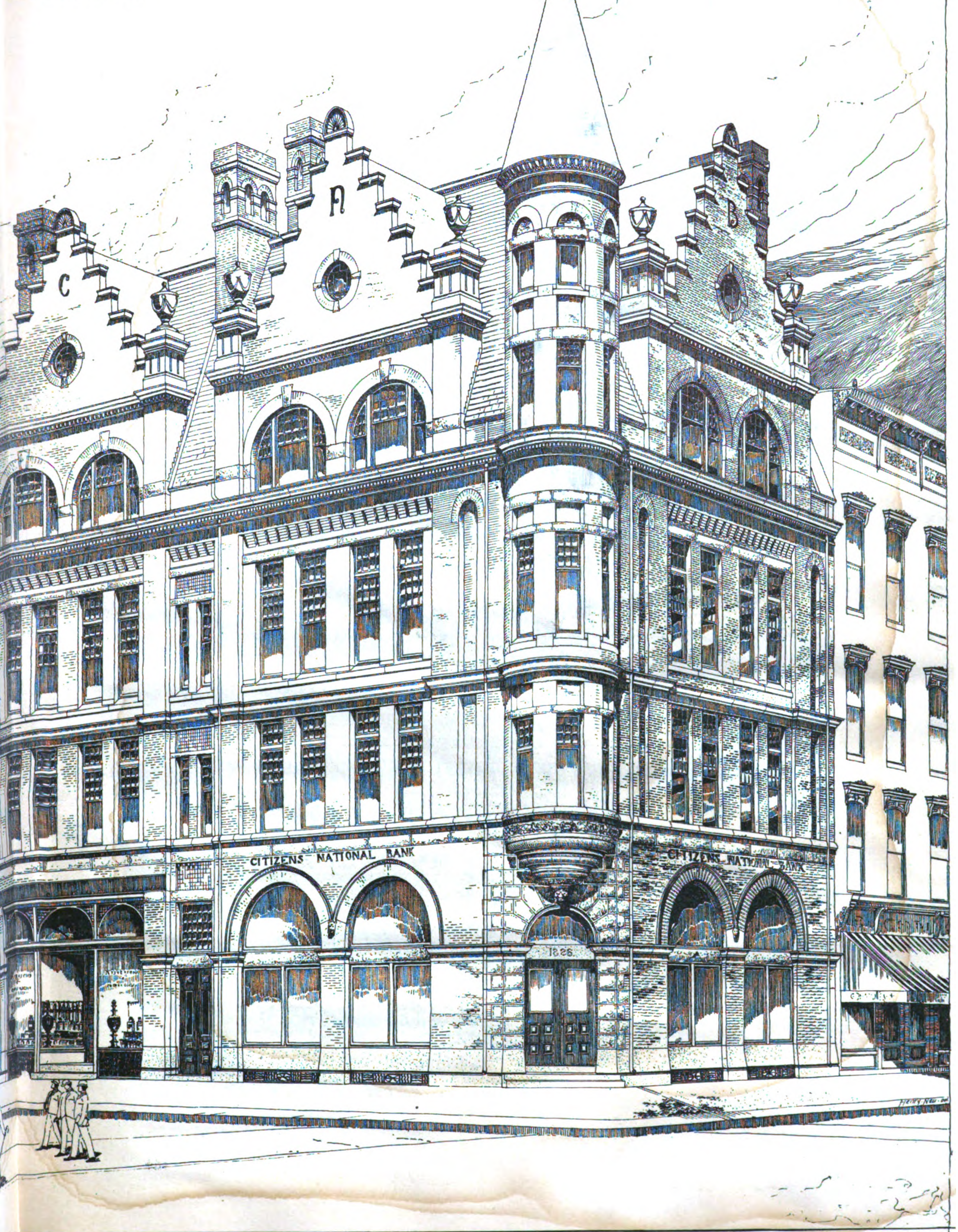

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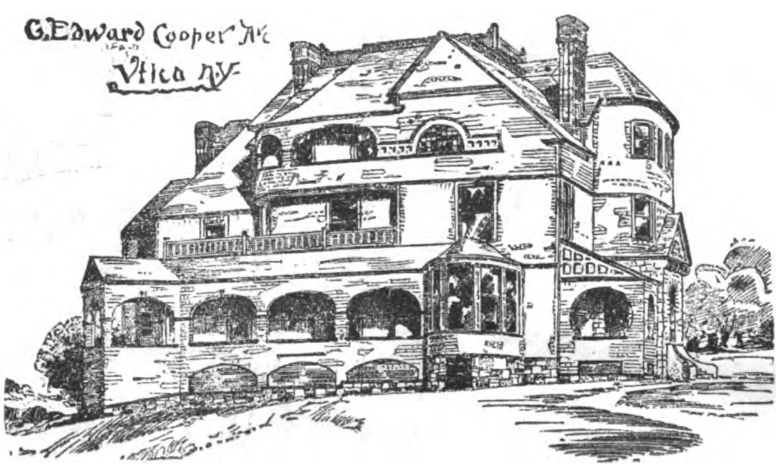

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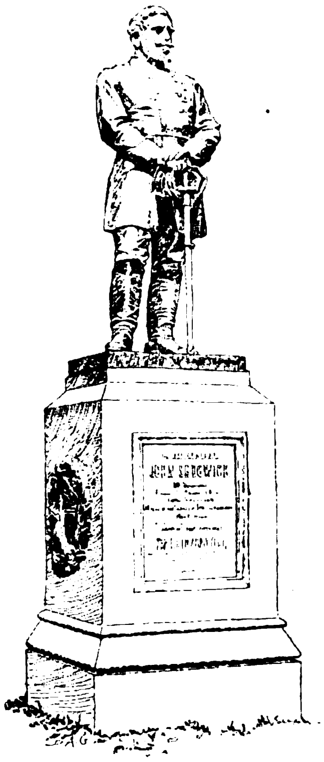

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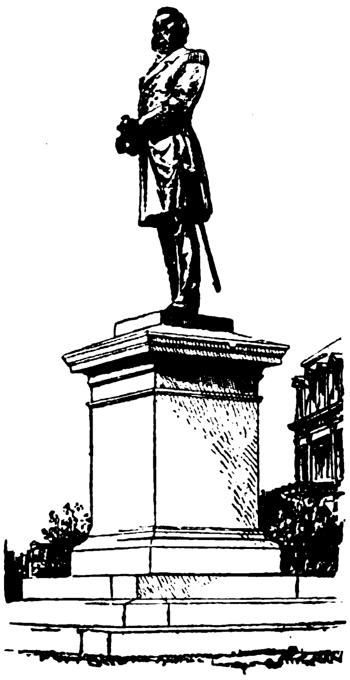

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"VICTORY."
ALBERT DARCQ.
SCULPTOR.

FROM L'ART.

THE MARKET PORTER
COUTAN SCULPTOR
REVUE DES ARTS DECORATIFS

STATUES.

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THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIV. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 661.

AUGUST 25, 1888.

Entered at the Post-Office at Boston as second-class matter.

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AN extraordinary story comes from Brooklyn, N. Y., to the effect that a building is about to be erected there which will have a tower five hundred and forty feet high. The structure to be so adorned is the "Union Biblical Institute," which is to be built for the excellent purpose of providing a non-sectarian place of education for young men intended for the ministry. Why such a building should need a tower higher than the Washington Monument is a question which may be debated in connection with that of the sort of theology which will be inculcated in it; but it seems that the upper portion is to be utilized for an observatory. To judge from the interesting design, reproduced from the drawing of the architect, Mr. Frank K. Irving, in one of our exchanges, we should say that this part, at least, of the programme has been somewhat hastily adopted. The top of the tower, instead of the hemisphere which indicates an astronomical purpose, is a high, pointed dome, octagonal in plan, surmounted by a cupola forty feet high, which would effectually cut off the view from the observatory of everything within a considerable radius of the zenith. Notwithstanding this rather important astronomical defect, we are told that the observatory is to be equipped with a telescope forty-eight feet long, which, as the observatory, according to the scale of the drawing, is only about thirty feet in diameter, and as its use in a vertical position is precluded by the cupola, we suppose will be stuck out of a window when the students wish to sweep the heavens with it, or make computations of the orbit of Mars, or engage in other scientific problems of the sort. Such as it is, however, the plans for the building have already been filed, land has been bought, and a million and a half is said to have been subscribed by "a few wealthy gentlemen" to carry it into execution.

A CURIOUS structure is said to be proposed in New York. There is already in that city a large colony of Chinamen, who are governed by a sort of representative body of their own. This Chinese Municipal Council has for a long time occupied an old house in Mott Street, where a considerable amount of public business was carried on for the benefit of the Mongolians. Now, the house having become too small for the uses to which it is put, it is to be torn down, and replaced by another which is to be designed in the Oriental manner, and built mainly, if not entirely, by Chinese workmen. Whether the New York Inspector of Building will approve the sort of architecture current in Pekin remains to be seen, but if not, the style can probably be modified to suit his requirements. It is said that a temple, or "joss-house," occupied a portion of the old building. If so, a liberal part of the new one is likely to be fitted up for the same purpose, and architects and others who take an interest in the externals of religious beliefs will find a new subject for study provided in the metropolis.

ONE of the most promising undertakings to which Congress has this year voted aid is that by which the United States Geological Survey is to ascertain the extent of arid lands in the United States which can be redeemed by irrigation, and to devise means providing the necessary water-supply on an extensive scale. As we understand it, a plan seems to be in view by which the surplus water of the tributaries of the Mississippi are to be collected in overflow reservoirs, and utilized for supplying a portion of the dry district, while the remainder of the territory is, we suppose, to depend upon the Colorado and Rio Grande systems. However the work of irrigation may be effected, it seems likely, if thoroughly done, to transform completely the southwestern territories. The vast tract which was marked in the school geography of our boyhood, as the "Great American Desert," is now, we believe, known to have been, not many centuries ago, one of the most fertile regions of the world, and its dry dust, properly moistened, still forms a deep, rich loam, perfectly suited for the highest cultivation. Through what influences the original water-supply has been diminished, and the soil reduced to useless dust, is not, perhaps, clearly understood, but the effect of restoring moisture to it is seen in various places, where artificial irrigation has been practised, and particularly in Utah, where the Mormon farms about the Great Salt Lake are said to be the most productive tracts of land in the world. If the whole of the desert basin, capable of being reached by irrigating canals, should be reclaimed, it is estimated that the area of cultivated land in the United States would be increased by more than one-half, and, even if the new farms were not of extraordinary fertility, their value, at a fair estimate, will be nearly three thousand million dollars, for agricultural purposes, without counting the value of the buildings, railways and other improvements which would be accumulated with the development of the country. Together with this development should, if what we are told is true, come a curious modification of the climate, not only of the irrigated region, but of a vast area lying near it. It is said, we do not know how truly, that the Great Salt Lake, which, like the Caspian Sea and the other salt lakes of Asia, had been rapidly diminishing in extent by evaporation, until the Mormon settlement, is now, since its banks have been cultivated, rising again, so that houses which once stood on the shore have been moved back, to keep them from being surrounded by the advancing water. If a comprehensive system of irrigation should be followed by similar results, we might fairly expect to see Arizona, New Mexico, Colorado and Utah, which now, in the best portions furnish a bare subsistance to twenty or thirty cattle to the square mile, converted into a moist, semi-tropical region, dotted with great lakes, from which balmy breezes would blow eastward all over the country.

LA SEMAINE DES CONSTRUCTEURS thinks that the Argentine Republic carries off the palm for extensive building operations. While Philadelphia and New York, with their two or three thousand new houses a year, seem to us tolerably enterprising in this respect, it is said that near Buenos Ayres a whole town is being built at once, consisting of eight hundred houses with a town-hall, post-office, court-house, library, theatre, and church, several hotels, office-buildings and restaurants, a tramway line and a system of sewers. The new town is intended for Italians, of whom great numbers emigrate to Buenos Ayres, and, out of compliment to them, is to be named Garibaldi, while the church is dedicated to Saint Rose, the patron saint of Garibaldi's mother, and preparations have been made for the establishment of a newspaper, the ***Garibaldino***, the first number of which will appear on the day that the new town is opened to the public.

WE are often indebted to ***Le Génie Civil*** for curious statistics. One of the most recent ones which it publishes is the census of horses and mules in different parts of the world. From this it seems that Russia is above all others the country of horses, containing nearly twenty-two millions, or about one to every four inhabitants. The United States comes next, with nine and one-half millions, or about one to every six inhabitants; and the Argentine Republic third, with four million horses, the number of these animals in proportion to that of human beings, being large in all the South American States. Of the European countries, outside of Russia, Austria-

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Hungary supports most horses, the number being three and one-half millions, or about one to ten inhabitants; while Germany, with a larger population, has only about three and one-third million horses. France possesses somewhat less than three millions, and England about the same number, but France counts three hundred thousand mules, while in England these hybrids are so rare as not to be worth enumerating. In Spain the mules outnumber the horses nearly four to one, the number of both sorts combined being about three millions. Holland, naturally enough, possesses but one hundred and twenty-five thousand horses, or one to thirty inhabitants, ordinary transportation being to a great extent effected by canal boats, which do not even always need horses to draw them, women being frequently harnessed at the end of the tow-rope.

ANOTHER interesting bit of information relates to an American industry, transported across the sea. In 1866, it occurred to Mr. George H. Page, of Dixon, Illinois, that a manufactory of condensed milk might with advantage be established in German Switzerland, the most pastoral of all countries. He built a little factory at Charn, at the outlet of the Lake of Zuy, and engaged the milk of a few cows. The enterprise prospered, and in ten years the factory consumed regularly the milk of two hundred and sixty-three cows: and in 1887, twenty years after the establishment of the business, it used the milk from more than seventeen thousand cows. It would hardly have been practicable either to utilize so much of such a perishable raw material in one factory, or to feed so many cows within reach of a single group of buildings, and, in fact, before this time six branch manufactories had already been established, of which three are in England, one in Germany, and one in New York State. In connection with the parent establishment at Charn, is a can factory, which supplies the tin boxes in which the condensed milk is put up. That the consumption of these is sufficient to keep the can factory busy may be inferred from the fact that last year more than twenty-nine million cans of the condensed milk were sold, the receipts from sales being nearly two million dollars. The parent factory, or rather, group of factories, is managed according to the most enlightened modern views. Schools, as well as houses, are provided for the workmen and their families, and funds for insurance and relief are established.

CONSIDERING that, according to Professor Riley, this is the year for the appearance of the seventeen-year locusts in this country, while many of the western states, particularly Kansas, are annually attacked by swarms of grasshoppers of other kinds, it may be of interest to learn from *Le Génie Civil* how such insects are fought in Spain and Algeria, where they are just now so numerous as to threaten the destruction of the crops. The most effective weapon now in use against them in Algeria is called the cypriote apparatus, and is the same as that employed by the British administration in the island of Cyprus a few years ago. The main element of the apparatus is simply a roll of yard-wide cotton cloth, about sixty yards long, stretched across the route which a column of grasshoppers appears to be pursuing, and held in a vertical position by stakes, while the lower edge, by means of cords and smaller stakes, is kept so close to the ground that the insects cannot crawl under it. On the upper edge of the cloth is sewed a strip of oiled or varnished material, six or seven inches wide and on the side next the grasshoppers, pits, a yard wide, two yards long, in a direction parallel with the screen, and three or four feet deep, are dug in the ground at intervals, and the upper edge of each pit is trimmed with a strip of zinc, ten or twelve inches wide, inclined downward. All these preparations are made while the head of the insect column is still a hundred yards away, and, meanwhile, men are sent out, who stand on each side of the column, and narrow it by flapping their clothes, so as to frighten the grasshoppers on the outside, and make them crowd closer to the centre, at the same time that they direct its march toward the middle of the cloth screen, which, in the case of a very large swarm, is made of extra length by joining two, and is then set in the shape of a wide V, with the opening toward the insects.

ON arriving at the screen, the grasshoppers try to fly over it, but the precaution is taken to spread it during the early morning, when their movements are sluggish, and their wings will not carry them to the necessary height. Failing in the attempt to fly, the insects than crawl up the cloth, until they reach the smooth, varnished edging, on which their claws can take no hold, so they fall back again. After a few such fruitless attempts, they decide to circumnavigate the obstacle at the ground-level, instead of trying to surmount it, and a general lateral movement takes place. Some of those who first arrived have fallen directly into the pits, and are prevented from getting out by the zinc rim; and the lateral march brings the others to the same fate. When the pits are half-full, Arabs with heavy feet and strong nerves are appointed to get in and trample on the grasshoppers, and, finally, the pits are refilled with earth, to which, where practicable, lime or some other disinfectant is added. By this simple apparatus, if the pits are made deep enough, and the whole is carefully set and well attended, an entire army of grasshoppers may be exterminated in an hour or two, and the screen taken away for service elsewhere. Up to June fifteenth of this year, it is estimated that four hundred millions of grasshoppers had been destroyed by means of it in Algiers. Of course, there are hundreds of millions left, but the Algerians are encouraged to persevere by the knowledge that the British, in five years from their occupation of Cyprus, and at an expenditure of less than three hundred thousand dollars, practically extirpated the insects from the island, which had been annually ravaged by them for generations, and now, at a yearly cost of about eight thousand dollars, keep the fields perfectly protected, much to the satisfaction of the natives, who have come to regard their new masters as benefactors rather than invaders. In Spain although the "Cypriote apparatus" is coming into use, millions of the insects have been destroyed with gasoline. Early in the morning, while the grasshoppers are benumbed with the night's cold, and are lying in the furrows which are, in many cases, made purposely for them, squads of men walk beside them, pouring gasoline on them from a watering-pot. As each comes to the end of his furrow, he lights the gasoline with a match, and the grasshoppers are consumed in a moment. Of course, this method wastes the gasoline which may soak into the ground, and a watering-pot has been introduced by which fire is prevented from passing back into the body of the pot, so that the gasoline can be lighted at the spout, and the grasshoppers watered with fire.

AMERICANS are often said to enjoy nothing so much as personalities in regard to people of note, and, judging from the sort of news provided for them by the foreign correspondents of the newspapers, there must be some reason for saying so. We, therefore, make no apology for mentioning that the widow of that remarkable architect and artist, Mr. E. W. Godwin, has just been married to the American artist, Whistler. The widow of another architect and artist of equal talent, but very different temper, Mr. W. Eden Nesfield, has happily escaped a cruel experience in the shape of a contest for the property left her by her husband. Just two years ago Mr. Nesfield made a will, leaving property to the amount of about one hundred and twenty-five thousand dollars to various persons, including his wife, who was made residuary legatee. One year ago, in August, 1887, another will was made, leaving the whole property to Mrs. Nesfield, and constituting her sole executrix and universal legatee. In March, 1888, Mr. Nesfield died. On the presentation of the will of 1887 for probate, it was opposed by Henry Nesfield, brother of the deceased artist, on the ground that the testator was not of sound mind when it was excuted; and the will of 1886 was submitted as the true one. Three eminent lawyers were engaged by each side, and preparations were made for a long struggle, but, on the calling of the case in court, three weeks ago, the counsel for Mr. Henry Nesfield rose, and said that within a few days his client had had an opportunity of looking through the documents in the case, and had come to the conclusion that he ought to offer no further opposition to the proof of the will of 1887, and that no evidence need be brought forward except that to show the due execution of the will submitted by Mrs. Nesfield, in order that probate might issue. The court accordingly confirmed the will of 1887, the parties agreeing that each side should pay its own costs. Whether this singular termination of the dispute means that the brother was bought off, or that he was really magnanimous enough, after satisfying himself of the soundness of the will of 1887, to withdraw his opposition from conscientious motives, we are, of course, unable to say, but we prefer to believe the latter.

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BUILDERS' HARDWARE.[1] — IV.

SCREWS.

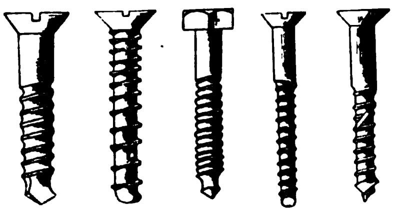


Fig. 8. Fig. 9. Fig. 10. Fig. 11. Fig. 12.

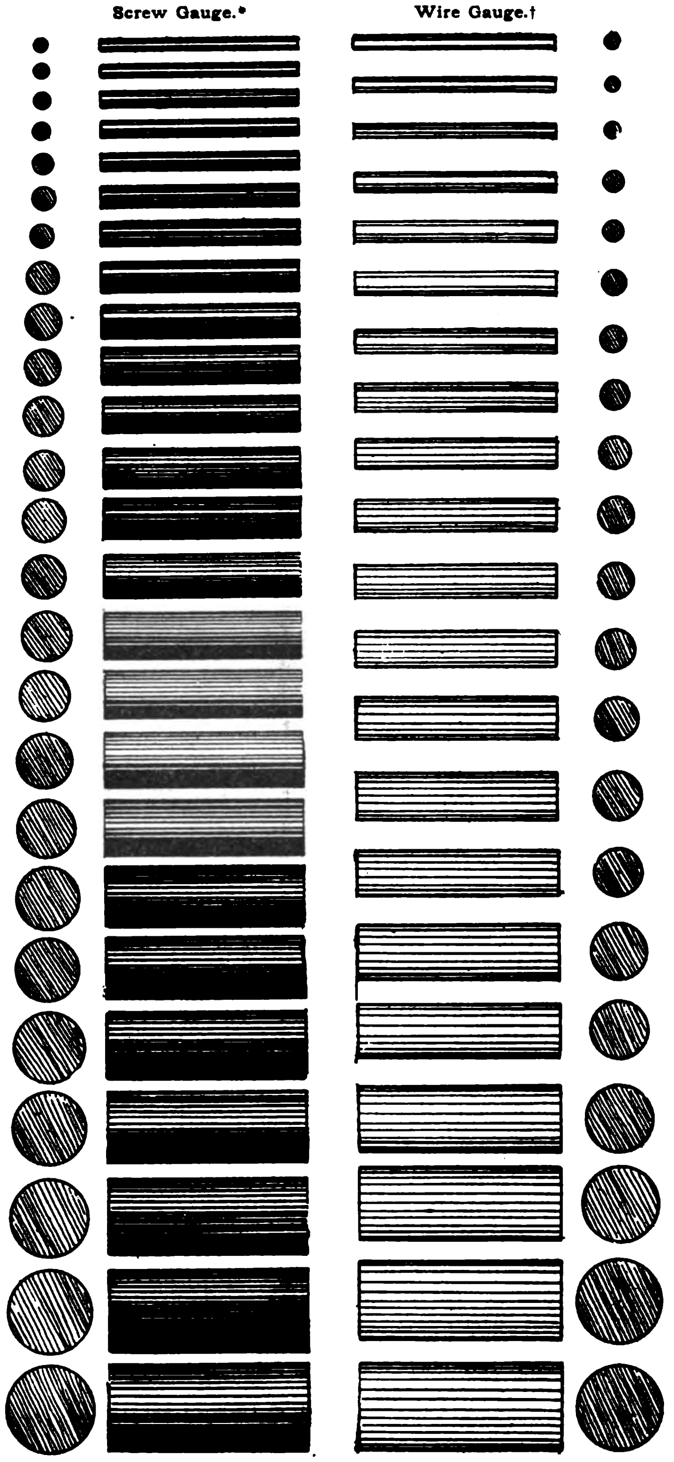
THE substitution of screws for nails in building operations is one of the most marked features of modern work, and is, in a way, indicative of the changes that have come about since Mediæval times. In those days men built for eternity; now, the object is to build so that it is possible to take the work apart; and nothing shows more clearly the extent to which this idea is carried than the variety of uses to which screws are put. There is, however, another way of looking at the change, and a more practical one, too, for screws certainly have a great many advantages which nails never could possess. They are much more secure when in place; they are neater in appearance; they require but little more labor in driving than nails, and can, at any time, be removed without injuring the material into which they are screwed. Some who have had trouble in removing old screws which had rusted into hard-wood work may object to the last statement. An old carpenter however, once told us of a very simple way to remove even the most obdurate screw: if a red-hot poker is held against the head of the screw for a few moments, the heat will expand the metal, loosening it from its hold on the wood, after which it can be readily unscrewed.

The improvements in the processes of manufacture of screws have been even more marked than those which have been noted in regard to nails. The blanks for screws were formerly cut out by hand. The first improvement was to cut them from rolled round iron, the heads being formed by pressing the blanks into a die while hot, and the threads cut with a file, a very laborious operation which resulted in a very poor quality of screw. The screw-working machinery, as at present in use, has very largely been designed by Americans: the blanks are cut and headed from coils of wire on one machine; another machine takes the pieces, gives the proper shape to the head and neck, turns the shank, and finishes the screw. It has been claimed that the entire operation necessary to turning out a perfected screw is so economical in its action, that the fluctuations in the first cost of the crude wire will often equal the total cost of manufacture.

The most important improvement which has been made in their manufacture is the application of the gimlet point, by means of which a screw can be turned into the wood without the aid of a gimlet or auger. It seems so natural now to us that it is difficult to understand why the world was so long contented with the poor productions of half a century ago.

Fig. 18. DIAMETERS OF WIRE.

(From American Screw Co.'s Catalogue.)



No.	Diam.	Screw Gauge.*	Wire Gauge.†	No.	Diam.
0	.0578			17	.058
1	.0710			16	.065
2	.0842			15	.072
3	.0973			14	.083
4	.1105			13	.095
5	.1236			12	.109
6	.1368			11	.120
7	.1500			10	.134
8	.1631			9	.148
9	.1763			8	.165
10	.1894			7	.180
11	.2026			6	.203
12	.2158			5	.220
13	.2289			4	.238
14	.2421			3	.259
15	.2552			2	.284
16	.2684			1	.300
17	.2816			0	.340
18	.2947			00	.380
20	.3210			000	.425
22	.3474			0000	.454
24	.3737				
26	.4000				
28	.4263				
30	.4520				

* American Screw Gauge. † Old Standard Birmingham Gauge.

The form and style of the ordinary screw, as at present in use, seem so perfect in every respect that it would be difficult to suggest any improvements. There are, however, a few forms of patent screws in the market which may be of interest in this connection. Figure 8 illustrates a screw, patented in 1873, fitted with a drill point instead of the ordinary gimlet point. Figure 9 is a screw with a thread somewhat like that of a bit, the thread, however, diminishing in pitch from the bottom to the top. Figure 10 is a form of coach-screw, having threads of a curved cross-section and provided with a wedge-shaped point, which allows the screw to be partly driven into place with a hammer. Figure 11 is essentially the same as the ordinary screw, except that the point is flattened, and it has a circular cutting-edge. Figure 12 is a wood-screw provided with a cutter and point in such a manner as to cut its way into the wood instead of pressing it to one side as is the case in the ordinary screw. None of these varities, however, have any very extended sale, and we are unable to say by whom they are manufactured or controlled. Figure 13 illustrates about the best of the patent forms. It is a diamond-pointed steel screw, manufactured by Russell & Erwin. Screws

[1] Continued from No. 660, page 74.

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of this form can be driven with a hammer their entire length into any hard wood, and then held by one or two turns as securely as the ordinary screw. The head is made convex to strengthen it and prevent its splitting when struck with a hammer. The thread is of the ratchet form, which permits its penetration without tearing the wood fibres.

Ordinary gimlet-pointed screws are made in four styles, depending upon the use for which they are intended. The shank and point are always practically the same. The head is either

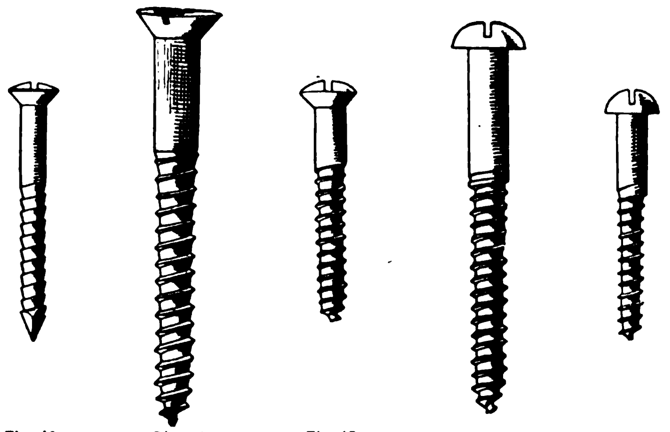

Fig. 13. Fig. 14. Fig. 15. Oval-head Screw. Fig. 16. Round-head Screw. Fig. 17. Piano-head Screw.

flat, Figure 14; oval, Figure 15; round, Figure 16; or of the form shown by Figure 17, which Russell & Erwin designate as having a "piano" head.

The kinds of screws which are manufactured for various purposes are almost infinite in variety, but so far as relates to

TABLE OF SCREWS.

Abridged from Catalogue of the American Screw Co. Price per gross.

Gauge.	0	2	4	6	8	10	12	14	16	18	20	22	24	30
¼	$.35 .52	$.35 .55	$.35 .60	....	....	....	....	....	....	......	......	......	......	......
⅜	.35 .52	.35 .56	.36 .62	$.37 .78	$.39	....	....	....	....	......	......	......	......	......
½	....	.35 .58	.36 .67	.39 .79	.40 .98	$.44 1.23	$.54	....	....	......	......	......	......	......
⅝	....	.35 .59	.36 .70	.39 .86	.42 1.09	.47 1.40	.56 1.75	$.66	....	......	......	......	......	......
¾	....	.35 .70	.39 .74	.40 .93	.44 1.22	.51 1.57	.59 1.97	.71 2.43	$.84 2.96	......	......	......	......	......
⅞	....	.38 .90	.40 .95	.43 1.01	.48 1.35	.55 1.73	.65 2.18	.77 2.69	.92 3.29	......	......	......	......	......
1	....	....	.42 1.04	.47 1.10	.53 1.48	.59 1.91	.72 2.40	.86 2.97	1.03 3.62	$1.21 4.35	$1.43	......	......	......
1¼	....	....	.51 1.38	.55 1.44	.59 1.73	.68 2.13	.83 2.83	.99 3.51	1.17 4.29	1.39 5.16	1.65	$2.00	$2.45	......
1½	....	....	.60 1.86	.64 1.92	.69 1.98	.78 2.58	.95 3.28	1.13 4.08	1.34 5.00	1.58 6.01	1.87 7.13	2.15	2.60	......
1¾	....	....	....	.73 2.45	.78 2.51	.88 2.91	1.05 3.72	1.27 4.64	1.52 5.68	1.82 6.84	2.09 8.13	2.30 9.53	2.77 11.07	......
2	....	....	....	.85 3.14	.89 3.20	.99 3.26	1.17 4.18	1.40 5.21	1.69 6.38	2.05 7.69	2.32 9.12	2.64 10.70	3.01 12.42	......
2¼	....	....	....	....	1.08 4.50	1.12 4.57	1.28 4.63	1.54 5.78	1.88 7.07	2.24 8.53	2.56 10.12	2.89 11.87	3.28	......
2½	....	....	....	....	1.22	1.28 6.23	1.43 6.29	1.71 6.35	2.07 7.78	2.45 9.38	2.81 11.13	3.15 13.04	3.55 15.12	......
2¾	....	....	....	....	....	1.63	1.69	1.89	2.27	2.66	3.07	3.42	3.87	......
3	....	....	....	....	....	1.97 9.00	2.02 9.05	2.09 9.11	2.46 9.17	2.87 11.05	3.32 13.12	3.76 15.37	4.22 17.82	......
3½	....	....	....	....	....	2.67	2.74	2.80	2.87	3.31	3.61	4.08	4.66	......
4	....	....	....	....	....	....	3.18	3.22	3.28	3.75	4.14	4.73	5.46	......
4½	....	....	....	....	....	....	....	....	4.15	4.18	4.80	5.54	6.38	......
5	....	....	....	....	....	....	....	....	....	5.57	5.63	6.46	7.3[illegible]	......
6	....	....	....	....	....	....	....	....	....	......	8.80	8.85	8.92	$12.67

The upper figures give the price of iron screws: the lower that of brass screws. *Discount*: 60 to 75% on iron screws, 55 to 70% on brass screws.

builders' hardware in general, it will be sufficient to consider only the wood-screws, that is to say, the screws made for working with wood. The materials of which screws are made for this purpose are iron, steel, brass, copper, bronze and phosphor-bronze. The screws commonly in use are of iron. Steel screws are comparatively little used on account of the cost. Brass, copper, and bronze screws are used in connection with finishing hardware. Phosphor-bronze screws are used only in special cases.

Iron wood-screws are made in twenty different lengths, varying from one-quarter inch to six inches. Brass and nickel-plated screws are made only as high as three inches in length. Each length of screws has from six to eighteen varieties in thickness, there being in all thirty-one different gauges; so that altogether there are about 250 different sizes of ordinary wood-screws in the market. Figure 18 gives the different gauges in use from zero to thirty. Iron screws are finished with either a bronze, japanned, lacquered on tinned surface. P. & F. Corbin also manufacture copper, bronzed, and silver-plated screws. These and a few special varieties are kept in stock by most dealers. The preceding tables give the sizes, prices, etc., of iron, brass and nickel-plated screws, compiled from the catalogues of the American Screw Company, and P. & F. Corbin.

Nickel-plating increases the foregoing prices as follows:

Length.	Guage.	On Iron.	On Brass.
½	No. 4	$1.09	$0.98
1	" 6	1.03	1.10
2	" 9	1.49	1.72
3	" 14	2.91	4.34

Intermediate sizes approximately at the same ratio. *Discount*: 75 and 66 %.

Besides the ordinary wood-screws, the only other kinds used constructively to any extent by builders are lag-screws, and hand-rail screws. The former are more commonly known as coach-screws, and are manufactured in 128 different sizes varying from ¼" x 1½" to 1" x 12". In appearance the shank and the gimlet-point are the same as ordinary wood-screws, but the head is square, like a nut, and without any cross-cut, so that the screw can be turned up with a wrench. The following table gives the prices of a few of the sizes, as per the lists of the American Screw Co.

TABLE OF GIMLET-POINT COACH-SCREWS.

Price per hundred. *Discount*: 66⅔ %.

Diameter in Inches.	Length under the Head.					
	1½	2½	4	8	10	12
¼	$2.70	$3.10	$3.70	..	..	..
5/16	2.70	3.10	3.70	..	..	..
⅜	3.10	3.50	4.10	..	..	..
7/16	4.00	4.50	5.25	$7.25	..	..
½	4.30	4.90	5.80	8.20	$9.40	$10.60
9/16	..	6.90	8.10	11.30	12.90	14.50
⅝	..	6.90	8.10	11.30	12.90	14.50
¾	..	10.00	11.50	15.50	17.50	19.50
⅞	..	..	16.50	22.50	25.50	28.50
1	..	..	22.50	30.25	34.25	38.25

Hand-rail screws or joint-bolts are usually made in two ways, either with one end cut with a wood-screw thread, and the other provided with a machine-screw thread and loose nut, or with a machine-screw thread and nut on each end. One nut is generally cogged so it can be turned up easily by a pocket wrench. Joint-bolts are of two diameters, either 5/16 or ⅜-inch, and the standard lengths are from four to six inches, though some manufacturers produce joint-bolts as long as fifteen inches. Joint-

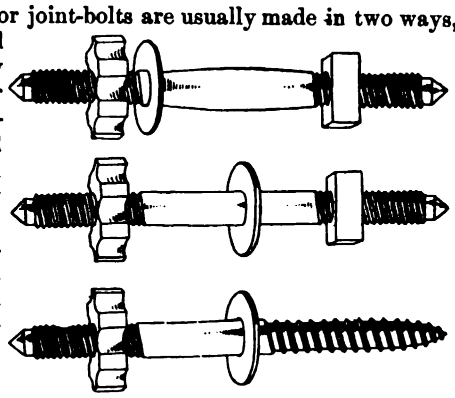

Fig. 19. Joint-bolts.

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bolts with two nuts are sometimes made with $\frac{7}{16}$-inch diameter with a swelled centre. Figure 19 shows the various forms of joint-bolts, and the following table gives the prices per gross.

TABLE OF JOINT-BOLTS.

Discount: 75%.

Diam.	Length, 4 inches.			Length, 4½ inches.			Length, 5 inches.			Length, 5½ inches.			Length, 6 inches.		
	One nut.	Two nuts.	Swell'd centre.	One nut.	Two nuts.	Swell'd centre.	One nut.	Two nuts.	Swell'd centre.	One nut.	Two nuts.	Swell'd centre.	One nut.	Two nuts.	Swell'd centre.
$\frac{5}{16}$	$9.00	$10.25	..	$10.00	$11.25	..	$11.25	$12.50	..	$12.25	$13.50	..	..	..	..
$\frac{3}{8}$	..	..	..	11.25	13.50	..	12.50	14.50	..	13.50	15.75	..	$14.50	$16.75	..
$\frac{7}{16}$	..	..	$16.75	..	..	$18.00	..	..	$19.00	..	..	$20.25	..	..	$21.50

Screw-eyes are too well-known to require illustration. They are made of steel, iron or brass wire, with a gimlet-pointed thread cut on the shank. Iron screw-eyes are made plain, bright, bronzed or nickel-plated. The diameters of wire used vary from wire guage 0, to 14, the lengths of the eyes being from $\frac{11}{16}$ to $2\frac{7}{8}$ inches. The list price in iron of the largest sizes is $9.00 per gross. The smallest size cost 95 cents per gross. Brass screw-eyes cost about twice as much as iron. These prices are with a heavy discount.

Figure 20 shows the common forms of screw-hooks. The list prices for these are $6.00 per gross for No. 4 iron, and $22.00 per gross for No. 4 brass. About the same variety of sizes are listed for screw-hooks as for screw-eyes. The smaller sizes of hooks can be had in brass with washers or roses at a slight advance in price. The hooks are made as large as $4\frac{3}{4}$-inch, No. 0 wire.

Picture-knobs or hangers are intended to screw into the wall, through the plastering. They are made with a long screw

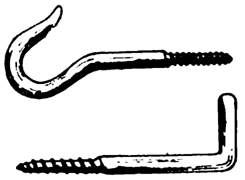

Fig. 20. Screw-hooks.

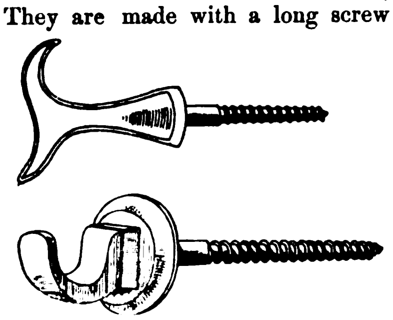

Fig. 21. Picture-hangers. (Half-size.)

shank provided with a knob of porcelain or metal, and are listed in four lengths, $\frac{5}{8}$-inch, $\frac{3}{4}$-inch, 1-inch and $1\frac{1}{4}$-inch; being sold at from $4.75 to $6.20 per gross, with a discount. Figure 21 illustrates one variety.

Picture-rod hooks are intended to support a rod on the wall, answering as a picture moulding. The list price (P. & F. Corbin) is from $2.00 to $4.50 per dozen, according to length and finish.

[To be continued.]

THE MORALS AND MANNERS OF ARCHITECTURE.

FOUNTAIN IN BASLE
AFTER "ILLUSTRIRTE ZEITUNG"

METHODS of practice have changed in a marked degree within twenty years. The demand for the services of the architect is more general and there is a greater willingness to pay fairly for such services. Although all real-estate interests are somewhat depressed, probably by the annoying effects of strikes, or the apprehension of them, there is still a good deal of work to be done and the calling is not overstocked; that is, with capable and industrious regular practitioners. If the best tendencies could prevail architecture is likely to be considered, what its disciples have long claimed it to be, a "liberal profession." Can it be fairly said that the tendencies are in the right direction?

In early years our business suffered from the jealousy of the builders, and still more from a general indifference and lack of appreciation of the usefulness of its functions. But the places and perquisites of its practitioners were not attractive enough to provoke envy or encourage encroachment. With the growing American demand for soft-handed occupations it has become the object of sharp and hostile criticism and active interference from several quarters; and its position and prerogatives are assailed, not only by its old rivals "the practical man and the civil engineer," but by the man of business, the man of science, and a motley horde of sculptors, painters, decorators, furniture-makers and upholsterers; and often by a union of some or all of these.

Work formerly under one direction is now divided and subdivided. Personality is sacrificed to profit. The single practitioner is placed in competition with associations of artistic and constructive talent, business shrewdness, and social influence backed by ample capital. Added to all this architecture has become to some extent the fashion as a genteel employment suited to the artistic amateur, attractive to him from the supposed lack of well-defined demands and limitations and from a distinguishing title that may be assumed or discarded at will. These tendencies have been noted in English practice also, and, to judge by the discussion in English journals, with much apprehension.

Such signs of change raise important questions of artistic progress and business methods in the design of buildings and the direction of building operations. Are such changes part and parcel of modern tendencies, and if so, what is to be their final effect on building? Or, are they defects of professional practice, the result of greed and a lack of honest devotion to true art, independent of outside influences and to be corrected by ourselves? The records of some of the most dishonorable ventures unfortunately bear some of our foremost names, and bad methods are often ignored or condoned if offset by temporary good fortune. In other professions the "free lances" are found on the flanks or rear. In architecture they as often head the column; and men whose talents would assure them legitimate success are among the first to encourage irregularities. One remedy for these and kindred evils that is most vigorously advocated, and as vigorously opposed, in England is the compulsory examination and registration, to be enforced by an Act of Parliament; and under which no man can style himself "architect" until he has passed an examination and received a diploma. No attempt is made to prevent others, not architects, from conducting building operations; and it is admitted that against negligence or fraud no diploma can defend a client.

Laws against bad buildings should be strictly drawn and intelligently, rigidly and impartially enforced. Every one concerned in building should be held accountable for his proper share of avoidable defects. Architectural societies should insist on the doctrine that there can be no good architecture without good building. Laws cannot make architects or ennoble the profession. Hard work added to natural qualifications are the only means to such an end.

If the tendency of practice is towards large associations and combinations what is to be the effect on students and draughtsmen? Will they be confined within narrow lines of routine work and forfeit all chance of breadth of culture, and hope of independent practice except as parts of a machine? What is to be substituted for the supposed confidential and intimate relations of architect and client? Will combinations, in order to meet large current expenditures be led, in dull times or habitually, to lower the rates of compensation, or make wholesale rates for quantity, as it were. And, lastly, can a school or combination do the art work, or even the constructive work, of a "master," or are we ready to admit that the day of masters is gone by, and that art and science are to be henceforth the slaves of trade and adopt the methods of the "Trust" and the "drummer"?

There is much reason to fear that architecture is following to some extent the tendencies of the times — and some of the worst tendencies. The country is suffering under an infliction of babblers and drones. Every one wants to talk and scribble and sketch, and few to study and work and draw. Facility in meretricious effects is the method of the many, and their coveted end money and notoriety. The worst work of the times finds publicity through the reporters' vulgar style displayed in slovenly print on rotten "chemical paper." It is fortunate that so much trash is recorded on so perishable a medium. The private library has given place to costly furnishings and bric-à-brac. Luxury usurps the place of learning. There is still reading, but mostly for amusement and excitement. As Lowell says, "We wonder at the scholarship of the men of three centuries ago, but they were scholars because they did not read so many things as we do. Their speech was the best, because they lunched with Plutarch and supped with Plato. We spend no less time than they did, but instead of communing with choice spirits, we diligently inform ourselves of the most commonplace trivialities. We are getting buried alive under this avalanche of earthly impertinences — becoming mere sponges saturated from the stagnant goose-pond of village gossip."

The architects, and also the masons and carpenters of the past, with access to a few noble buildings, or some simple volumes, by loving and thorough study achieved works that even in their decay evoke our heartiest admiration. Their advances were by slow and well-considered steps.

The greatest works of our own and elder days are commonly marked by great restraint. Many of our large structures would be improved by stripping them of much of their ornamentation, which often detracts from the massive grandeur of high-piled brick and

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stone. It would be easy to point out pretentious buildings of which the rear blank wall is more impressive than the ornate façade where "vaulting ambition has o'erleaped itself."

Among craftsmen the unscrupulous loafer, if favored with an oily tongue, can often lead to slavery the skilled labor of the nation. In like manner the youth who can cleverly render a ruin, and has command of a smattering of artistic slang, dubs himself "Architect," rifles the Arab's tent and the Indian wigwam for novelties and dodges, with which to stimulate a debilitated public taste that has been encouraged to demand the new rather than the beautiful, and is permitted to squander peoples' money and abuse honest bricks and mortar. Art, like society, is afflicted with a plague of restlessness.

Many who recognize these evil tendencies are afraid to take a bold stand against such abuses for fear of misconstruction or misrepresentation. One is fearful of being thought lacking in this or that accomplishment which may be temporarily in favor. There is not enough patience and faith in the trial of time. Success must be achieved by leaps and not by climbing. An architect of ability reintroduces an old style of which he has acquired control by long study. Aided by an attractive personality and great persuasive powers he makes it a pecuniary and artistic success. He is at once copied, not only by weak disciples in a weakly manner, but by men of sufficient brains to lead in a path of their own choosing. Cathedrals, castles and convents are pressed into service in bulk or jumbled together with little regard for age, climate or previous condition.

With such mixed and false application of design is united an equally false presentation of it. For an intelligent showing of a building there is offered the sketch of the impressionist, or rather of the visionary. The true purpose of architectural drawing — to enable workmen to carry out a design and to realize in lasting materials the conception of the architect — is entirely lost sight of.

There were few if any architectural sketches, as we understand the term, in the days of the work we profess to admire the most. In real constructive art, every drawing is a working-drawing; there is no such thing as "exhibition" or "show" drawing. The power to design has no necessary connection with the power to draw. Many excellent pictorial draughtsmen are utterly weak in invention, combination and taste, and never produce a building worthy of respect, unless they copy it outright. The power to draw with accuracy and facility is of great use to record and interpret ideas and facilitate their expression. Without ideas the power is a delusion and a snare both to draughtsman and employer.

An architect should be a true artist, that is, he should create by necessarily slow and deliberate methods useful and beautiful structures. But structures they must be and not the chaotic product of ill-digested and half-comprehended sketches. An architect should not be an artist in the common sense. He has no rivalry with the easel painter and there is no ground of comparison between them. The work of the latter ends where his begins. The only use of pictorial art to the architect is a questionable commercial one — the enticement and delusion of clients. It has no more real connection with proper architectural design than the cheap politician's trickery has to do with statesmanship.

Architectural drawings, when true to their purpose, are utterly uninteresting to the general public. When treated in a manner to excite popular attention they cease to be of technical value. A gallery of simple views of good buildings would be deserted for a collection of third-rate paintings or even first-rate chromos — if not labelled as such. And yet buildings erected from these very drawings might elicit enthusiastic praise. The public are right in this. They recognize the unreality of the paper and pen-and-ink building. They always suspect some trick in it. And yet this sham is kept up by ourselves at the expense of the permanent success and dignity of a noble calling. It has become the fashion of late to rule out photographs from the galleries of architectural exhibits. Properly, they should be the only representations of buildings allowed. What matter whether the medium of the designer's control be a bit of board and a pencil or a floor and a piece of chalk so that it produces a worthy structure?

The art of the architect is far above and beyond that of the mere easel painter. The desire to be known as a draughtsman, principally, is a pretty sure sign of weakness in more important attainments. The great general has little ambition to play in a brass band. It is one of the most singular and discouraging features of modern practice that so much stress should be laid on the mere power to render drawings; that men in the practice of a combined art and science that for successful results requires the highest natural qualifications developed by the most unremitting labor and study should be willing to waste much of a short life on draughtsmen's tricks or even on finished pictures. It certainly shows a false tendency, but some of its causes are sufficiently evident.

The building art of to-day has to deal with many new conditions, among which are the various forms and varieties of competitions, the business interests of the architectural journals, the exhibitions of architectural drawings, the pictorial advertising, which is a part of all these, and the division of labor in architectural combinations. The evils of competitions have been repeatedly rehearsed and are inseparable from their practice. In spite of the volumes written on the subject and the experiments tried and regulations recommended during the last fifty years, they remain to-day as fruitful of bad feeling, bad morals and bad building as at their first institution. They have no parallel in any like calling, and architecture can never be a true profession while they continue. A client wishes a building-design. He is given a choice of pictures and is told, what is known to be false, that he is competent to obtain what he desires in such a manner. The country deacon is patted on the back and encouraged to think that he can discriminate between water-color washes and pen-and-ink hatching, or to choose between a "cooked" perspective and a geometrical elevation. He is persuaded to believe that he can see through or smell through a system of ventilation by noting a few flue sections and arrow-marks on plans, and determine acoustic qualities by dimensions in feet and inches. His ears are filled with eloquent gush about the interest of the problem in hand and the desire of the architect to treat it regardless of remuneration. He is encouraged in the prevalent notion that an architect is a composite creature, art enthusiast, speculator and magician, whose brain teems with graceful designs from which it must be promptly relieved or fail from a sort of art apoplexy; who lives chiefly on fame and whose only ambition in life is the pleasure of serving clients at any personal sacrifice. This phenomenal devotion to one's art in these practical days is perhaps characteristic of no other profession. Even the country deacon finds it phenomenal and is apt to doubt its entire sincerity.

Professional journals, when started by associations of architects, have been but short lived. Even when they have begun as semi-organs of the societies the connection has never been permanent. No periodical of the kind has been, or perhaps can be at present, devoted to the true interests of architectural art or advocate boldly the highest standards of practice. Subscribers and advertisers must be had in large numbers and from all classes, and illustrations must be attractive pictures rendered with an express view to processes of reproduction and furnished for publication, so far as possible, free of cost. There is a constant rivalry in extent of circulation. Buildings of the meanest description and utterly devoid of interest must be rendered and presented in as attractive form as may be to avoid offence and to please the many. Influential practitioners and capitalists must be catered to. Popular notions must be coddled. In short, the money interest must be kept steadily in view and no position must be taken likely to seriously imperil it. In spite of these conditions, the standard of the architectural press is far above that of its daily contemporaries, and where the latter cater to some of the worst elements, the former is doing much good educational work, especially in the reproduction of buildings, old and new, from photographs, as they actually exist. Still, the business interest must be paramount, and the subscription-list represents all classes, the best and the worst. Publishers cannot be expected to evince much chivalric interest in the higher aims of the profession. That which will command a ready sale must be offered in a salable form. Competitions and exhibitions must be encouraged that the showy results may fill their pages and attract patronage. Aided by a class of practitioners whose personal peculiarities or training and the organization of whose offices favor the methods of the successful competitive adventurer, they endeavor, with considerable success, to impress upon the public mind that such tournaments are necessary and permanent features of regular practice.

That which people have constantly forced upon them by persistent and confident reiteration they begin to think must have some basis of truth, and a considerable minority are dragooned, in spite of their honest convictions to the contrary, to take part in the scramble or to see themselves deprived of a share of certain desirable classes of work that would otherwise fall to them in the ordinary course of business.

Though individuals may profit for a time by the misuse of their professional position, in the long run the degradation of their chosen calling will not prove profitable to any. If the majority of competent architects maintained a uniform dignity and consistency in practice there would soon be little cause to complain of clients, and even legislative bodies might be induced to treat them with as much consideration as they would show to a builder perhaps. Where do people get the notion that the architect's service may be gratuitous or given on a chance of pay, if not from architects themselves? Where do they learn that stationary and draughtsmen's work is the basis of compensation and not the native ability and cultivated and matured powers of which these are but the tools and implements?

One of our leading journals advised us not long ago that "many of the better class of architects have for years refused to take part in any competition whatever." "Whether this is the wisest course for them we will not undertake to say, but a new class of architects is now growing up in this country, composed of men who long for the fray of friendly rivalry, who feel that they learn more even by defeat than by victory, and hold the mere selfish advantage of winning very lightly in comparison with the invigorating and stimulating exercise in their noble art which the contest itself affords to all who take part in it honorably."

Would it be possible to parallel such a statement as this in a technical journal of any other profession? Is there a "Dodson & Fog" class coming up among the lawyers who want no fees unless they "can get them out of the defendant," or, to be more accurate, who only "long for the fray of friendly rivalry." If this be progress what sort of practice will the next set of juniors initiate? Again, a reviewer of the published life of a distinguished contemporary says of his course in an important competition, "It was, of course, an immoral thing to do and the rebuff was deserved, but one cannot help regretting that the attempt was not successful." This can

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hardly be styled what is known in modern slang as "Sunday School politics," but it is altogether too common a way of treating architectural morals.

In treating of the effect of professional combinations it is not intended to include the simple partnerships of architect with architect. These may be entirely legitimate, and may produce as good work as individuals. To such as shrink from meeting heavy responsibilities single-handed, and have no great care for personal achievement they offer certain inducements. But pronounced individuality of temperament would lead others to prefer the slight and brief distinction that might come to them as John Smith rather than a share of the reflected glory of Messrs M. Angelo, John Smith & Co. There is no doubt that under given conditions good work can be done by combinations of architects. In some respects much service may be of positive business advantage. But the experience of the world inclines one to believe that the greatest results must come from the single master hand. Or at any rate, that the helpers must be entirely subordinate to the master.

But these legitimate unions in no way injure the welfare of the profession. Their fame and their profits are divided by the number of partners; and where one client prefers the advantages of multiplied talent and a large establishment, another elects to deal with the one controlling head of all the departments of his building.

But a second form of combination has been fostered by the course of some architects. These have persistently cultivated the belief that the great building artist was above practical matters and the small details of construction and supervision. That his art was monumental and above the trivialities of convenience and healthfulness, these he must either neglect or employ various experts and agents to devise and direct, leaving him to conceive great designs to be reduced to everyday usefulness by humbler assistants. Or to select from another class: a man that has no qualifications assumes the name of architect, and employs designers as well as other experts to execute the work that he secures, and claims all credit for. The men of the world, looking at these positions from a practical standpoint, conclude that if an architect can be produced by combination they can patch up one for themselves. Hence the grouping of the man of business, or builder perhaps; a decorator; upholsterer or cabinet-maker; and one or more pictorial artists for the show business. An engineer may be the head of the group or one of its members. Generally the lion's share of the profits of this architectural "trust" is taken by the manager or broker of others' talents. One can easily see that with a large class of clients, and especially with committees striving to get twenty men's work for the payment of one fee through the medium of competition, the superficial advantages that can be put in evidence must far exceed the efforts of the struggling young practitioner with but his own head and hands and slender purse to rely on; to be sure he can "learn by defeat," and his education will be ample if not profitable.

It is admitted that these peculiarities of modern practice are endangering the standing of the profession with its employers, and the question naturally arises: "What are you going to do about it?"

A review of the work of the American Institute of Architects and its Chapters and kindred societies shows that membership has increased, that many meetings have been held, and that on the whole they have gained somewhat in interest. A large sum of money has been expended in the publication of reports of proceedings and other papers, and some useful information has been disseminated. The local societies have in some cases done more thorough and useful work, especially in an educational direction, than the national one. But when one looks for important results, as embodied in professional custom and practice, not much is found. Something of improvement has been secured in building-laws. A schedule of "usual and proper charges" has been issued and amended. Its recommendations have been followed by the members when found agreeable and in furtherance of selfish interests, but too often disregarded. An able committee prepared and printed "a tract on competition," in which the reasons against the practice outnumber and outweigh those in its favor; and yet the report closes with suggestions for regulation and not for abolition. And the effect of these suggestions, although backed by influential names, led to no practical improvement and has not even bound the members of the society that endorsed them.

An elaborate form of contract has been printed, but so wordy and so obviously oppressive to the contractor that it has never come into general use.

Open fraud has been usually condemned, but there has been little loss of caste by those known to habitually indulge in practices over-sharp or unwarrantably selfish. Those favored by temporary good fortune or natural attainments have paid little heed to the rights of weaker brethren. Professional union has been a rope of sand. There has seldom been a case in court in which conflicting testimony on usage and custom has not been given by men supposed to travel by the same road.

The fact that so little has been accomplished by the societies should not discourage associations. If the old organizations are defective let new ones be started, and started with the determination to treat the vital questions of practice, and to neither ignore nor evade them. Six good brave men in each of our large cities could do more to establish the profession on a firm basis than any number of lukewarm societies of the present order. Let a minimum rate of compensation be established and recommended. Let it be agreed that all men with exceptional advantages shall increase their rates, and shall continue to give all work their full personal attention. Thus neither employer nor employed would be the loser. Make it clearly understood that an architect is to be judged by his buildings only. As Professor Kerr says of an architect: "If his buildings will not stand — nay if they are not manifestly stable — they fail in the first requisite of art; and it is the fact that the building is a structure, and not a mere design, which raises architecture so immeasurably above scene-painting."

We cannot eradicate selfishness by ordinance or the edicts of societies. But if architecture in the future is to be an art or even a profession, the time is ripe for all who hold such convictions to unite in an earnest effort to demonstrate its right to such distinction.

JOHN A. FOX.

ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

ENTRANCE TO THE COURT-YARD OF THE HOTEL PONCE DE LEON, ST. AUGUSTINE, FLA. MESSRS. CARRERE & HASTINGS, ARCHITECTS, NEW YORK, N. Y.

[Gelatine Print issued only with Gelatine and Imperial editions.]

PLANS OF THE HOTEL PONCE DE LEON, THE ALCAZAR AND THE METHODIST EPISCOPAL CHURCH, ST. AUGUSTINE, FLA. MESSRS. CARRERE & HASTINGS, ARCHITECTS, NEW YORK, N. Y.

THE Ponce de Leon is built in the style of the early Spanish Renaissance, which was strongly influenced by the Moorish spirit. The coloring is as rich and varied as the outline. The main material used for the building — towers and all — is a shell-composite of a light mother-of-pearl color, that glitters in the sun and turns to dark blue the shadows cast upon it by the deep reveals. In contrast with the main coloring is the bright salmon of the terra-cotta, which is the material of the ornamentation. This is very rich on the towers and in the court — indeed the balconies high up on the towers are of solid terra-cotta and weigh five tons apiece — but the outer walls of the building are simpler, following a rule of this style of architecture, and the lively salmon coloring appears only in the quoins, in the arches of the windows and verandas, and in the corner towers. While we are speaking of color we must not forget the dark Spanish roof-tiles or the rich faïence over the main entrance. Before entering the court we must notice that the building is a monolith. A mile away, on Anastasia Island, there are quantities of tiny broken shells that you can run like sand through your fingers. Thousands of carloads of this shell-deposit or coquina were brought over and then mixed with cement, six parts of shell to one of cement, the whole forming an indestructible composite. It is not exact to say that the hotel was *built;* it was *cast.* For there is not a joint in the building; the material was made on the spot, poured in while still soft and rammed down three inches at a time.

But we must now pass under the portico and enter the court, which by the way is 150 feet square. The half of the court towards the entrance being lower than the other, you ascend by various short flights of steps. Around the court runs a corridor. Opposite the outside entrance is the great, low archway through which you enter the hotel. "Ponce de Leon" is the legend that runs around the arch — carved on shields, a letter to a shield. Above this arch is a brilliant mosaic. There are also two entrances for ladies, one in the centre of either wing. On either side of each entrance in a niche in the wall there is a fountain. The water issues from the mouth of a dolphin, carved in high relief. Indeed, the ornamentation of the whole court — and there is plenty of it and all imbued with the rich Renaissance spirit — suggests the marine character of the main material of the building. Mermaids sport among the shields of the great arch, and shells appear everywhere. Notice also the scrolls here and there, carved with quaint Spanish proverbs. But the unique feature of the court is the great grille, or cage, rising from the top of each side entrance to the corridor of the third story. These two cages are filled with climbing plants and gorgeous flowers, among which flash birds of brilliant plumage.

A broad flight of steps ascends from the court to the platform before the main entrance. The vestibule is rich in marbles. We now enter the huge space occupied by the rotunda and the corridor around it. The floor is an elaborate mosaic made of tiny bits of marble in the Renaissance manner. There are two very large marble fireplaces, contrasting with the elaborately carved oak wainscoting. In two corners there are fountains.

It is the rotunda itself that claims the attention. It is supported by four great piers and eight oak pillars, on each of which are carved four caryatides of life-size. The rotunda is four stories high, and around each story runs a corridor with different arches and columns. The great dome is decorated with figures carved in high relief and above these with paintings after original designs, allegorical representations of the history of Spain and Florida. The

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general effect of color is very rich. You look straight up through an open space in the form of a star, formed by penetrations in the dome, to the copper columns of the lantern.

We must now get a glimpse of the grand parlor — a room 104 feet by 53, but divided practically into five rooms by arches, *portières* and screens. A noticeable feature is an immense mantel-piece rising to the ceiling.

A flight of marble steps ascends from the rotunda to a mosaic platform from which you pass through a short hall into a room as large as many an opera-house. This is the great dining-room. The central part is divided from its two rounded ends by rich oak pillars supporting a dome around which runs a clerestory. The room is lighted by numerous bay-windows of stained-glass, illustrating allegorical subjects. The coloring of the decorations in general carries out the Renaissance spirit that appears everywhere else in the building. The dining-room, like all the rest of the hotel, is lighted by electricity. If dining is ever a fine art, it surely can be made so here, if one is fortunate enough to get a table near a window that overlooks the orange groves, sweet with flowers, brilliant with leaves and fruit, and vocal with the hum of innumerable bees.

As to the part of the hotel devoted to the service, it is quite separated from the rest of the building by the dining-room. When we say that the pantry is over a hundred feet long, we can leave the bakery, the kitchen and the oven to the reader's imagination.

The dining-room can be approached from the gardens. We have already noticed the steps leading from the rotunda to the platform at the entrance of the dining-room. Underneath this platform and extending from garden to garden is an arched passage, twelve feet high, and richly decorated in terra-cotta. Carriages can drive through this passage, which is really a great porte-cochère. From it, steps ascend six feet to the rotunda, from which you ascend six feet more to the dining-room entrance. There is another such tunnel behind the dining-room.

Perhaps the most prominent feature in the grounds is the Cascade. When the workmen were boring for water to be used for the domestic purposes of the hotel, they came upon a sulphur spring of such force and volume that it was decided to use the water for driving the machinery. This spring emits ten million gallons of water in twenty-four hours. The Cascade is 450 feet long and is built up in the manner of the great Cascade of St. Cloud — ornamented with fountains, statues, stairs, etc., and lighted by electricity.

But there is another garden to see, and this is a unique garden sixty feet above the court! Between the two towers and looking down into the court on the one side, while it opens toward the interior of the dome on the other, is a broad, paved terrace covered with an arbor of vines and plants. To this elevators ascend from the ground-floor. This terrace is extended to the two sides of the building, forming thus a splendid promenade. The view takes in the sea, the town, the gardens, and the Florida wilderness that creeps up to the very door of St. Augustine. The width is forty feet, and offers a temptation to a dance under the vines and flowers of this similitude of the hanging gardens of Babylon. The great towers can also be ascended and from these a yet more extensive view may be obtained.

We have now seen the public rooms of the Ponce de Leon, and a word should be said about the rooms for guests. These are all spacious; some of them open on the court garden, some on the loggias of the court or on the balconies, while all are airy and command charming views. The difficult problem of combining the best plumbing and heating apparatus with the best architectual appearance has been grappled with and successfully solved. Indeed through the whole building comfort and beauty go hand in hand, and neither is ever sacrificed to the other.

The Alcazar serves the purpose of providing amusement and occupation to the visitors of the Ponce de Leon, while it furnishes, at the same time, a dependence for those who cannot find rooms in the main hotel. Though very different in detail from the Ponce de Leon, it follows the same general architecture. The great façade presents a pleasing variety of towers, pavilions, minarets, arcades and roofs of old Spanish tiles. First there is a crescent arcade of shops, opening on the Alameda, or broad *plaza* that separates the Alcazar from the Ponce de Leon. Then you pass through to a square court, a sort of Palais Royal with numerous bazaars, gay with all sorts of wares; a good place to spend a rainy morning, as a covered arcade extends around the court in front of the shops. This court is also a tropical garden. The Alcazar has a great sulphur swimming-bath, a salt-water bath, tennis-grounds, club-rooms and all sorts of aids to merry-making. Besides all this it has 300 bedrooms and a large general restaurant. Connected with the Alcazar there is also one of the finest Turkish and Russian bath-houses in the world.

ENTRANCE TO HOTEL PONCE DE LEON, ST. AUGUSTINE, FLA., WITH "PORTCULLIS," LEADING FROM KING ST. TO COURT. MESSRS. CARRERE & HASTINGS, ARCHITECTS, NEW YORK, N. Y.

TOWER, DOME AND TERRACE OF HOTEL PONCE DE LEON, ST. AUGUSTINE, FLA., TAKEN FROM EAST TOWER. MESSRS. CARRERE & HASTINGS, ARCHITECTS, NEW YORK, N. Y.

ALCAZAR HOTEL, ST. AUGUSTINE, FLA. H. M. TAYLOR, ESQ., OWNER. MESSRS. CARRERE & HASTINGS, ARCHITECTS, NEW YORK, N. Y.

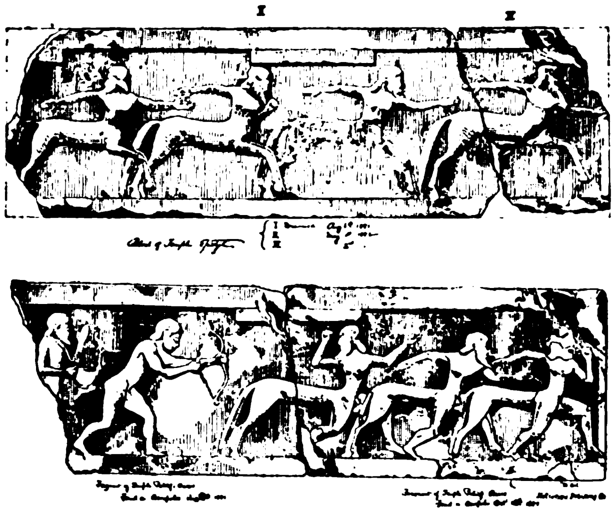
EQUESTRIAN MONUMENTS. — IV.[1]

WHETHER or no a centaur may be considered an equestrian figure, he is too graceful a creation of mythological art and literature to be neglected and innumerable examples of the popularity of this theme have come down to us, most of them as more or less fragmentary bits of sculptured friezes which depict the battles of the centaurs and the Lapithæ, their destruction by Hercules, their contests with the Amazons, or their abduction of both named and nameless females. In these scenes it seems as if the sympathy of the observer must go with the hybrid. He seems pathetically handicapped, as if he were always conscious that he is vainly struggling with a too powerful fate. Yet get him alone by himself, he seems a most happy individual, a faunishly insouciant creature, always able

Pegasus and Centaur. — From a Vase.[2]

Engraved Seal showing Medusa, Pegasus and Centaur in one.[2]

to travel without fatigue, untroubled by clothing, having fear of neither bit nor harness, not having to endure the neglect and cruelty of grooms, and withal able to read, to pipe, to talk, to eat delicacies, to enjoy life, in short, as few created creatures can. It is no wonder that he was a favorite subject with sculptors who knew how to blend the divine grace of the human form with the almost equally subtile charms of the perfect horse. The two centaurs in the Museum at Naples are, in their way, the most enjoyable of statues and amongst



Reliefs from the Temple at Assos. Sketched by F. H. Bacon.

the most famous, yielding in this respect to the black marble ones in the Capitol at Rome only because more people go to Rome than to Naples. The centaurs of the Capitol are said to have been executed in the time of Hadrian; at any rate they were removed from Hadrian's Villa to the Capitol in 1736. They were sculptured by Aristeas and Papias Carian, sculptors. The centaurs of the Capitol incompletely reproduce the allegory of the joyousness with which youth endures the assaults of love and the anguish and torment that its transports bring to riper age — incompletely, since these centaurs do not bear the winged and tormenting cupids on their backs which are found on the centaurs of the Louvre and elsewhere, and were

[1] Continued from No. 660, page 76.

[2] From Müller's "*Denkmaler der Alten Kunst.*"

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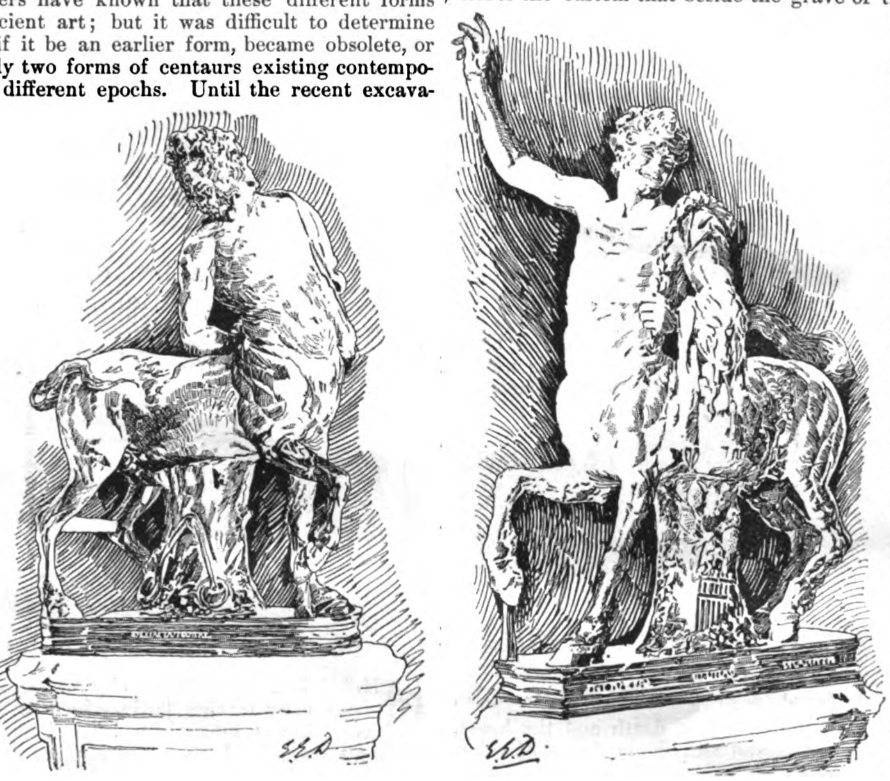
possibly found on the original pair after which the Rome and Paris statues were probably copied. Lübke seems to think that the Capitol centaurs themselves originally had cupids on their backs.

As the centaur was altogether a mythical being, and more a creature of the imagination even than the gods and goddesses whom ancient sculptors so often selected as their subjects, and for whom they could conceive no more fitting presentment than to fashion them in the semblance of perfect human beauty, greater liberty was taken with them in deciding on the manner in which man and horse should be combined; but we are most familiar with the type which shows the upper-half of a human body set upon the shoulders of a horse. The fact that the Greeks used different words "centaur," "hippo-centaur" and "onocentaur," which are now translated as meaning the same creature, may really indicate that the centaur was more man than horse, while what are usually called centaurs, in which the horse predominates over the man, should strictly be called hippo-centaurs. Those interested in such matters have known that these different forms were represented in ancient art; but it was difficult to determine when the earlier form, if it be an earlier form, became obsolete, or whether there were really two forms of centaurs existing contemporaneously in the art of different epochs. Until the recent excavations at Assos this dividing line was obscure, but there was discovered there a temple bas-relief which showed centaurs of a very archaic model, dating probably from the sixth or seventh century before Christ, which had the striking peculiarity that the fore-legs of the hybrid were human and only the hind-legs equine. A still more singular fact is that upon another part of the same frieze are centaurs fashioned in the usual way. Are the first, then, centaurs and the second hippo-centaurs?

From a Vase.[1]

Another type, supposed to be of Phœnician origin, was brought to light in 1880 at the Villa Benvenuti, near Este in Italy, where embossed on a bronze situla, or water-jar, was discovered a centaur which differed from the common kind in that he was furnished with wings, and thus seems to form a connecting link between the winged bulls of Assyria on the one hand and the classic Pegasus on the other.


The Centaurs of the Capitol. Aristeas and Papias, Sculptors.

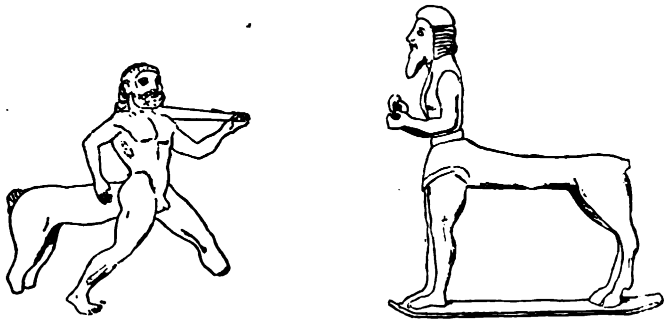
So far as it is possible to determine the ancients rarely attempted to model in the round Pegasus, the special servant of the Muses, although he was a favorite subject with painters and poets. Whenever they did model the winged steed, it was probably as an isolated and unbestridden animal, for, with the exception of Bellerophon, there would be no man who could with appropriateness be placed on his back, and the difficulty of reconciling a rider's legs with wings growing from his horse's withers probably prevented any attempt to represent some favorite poet of the hour on the steed of the divine nine. It was left to French artists of a later day, Coysevox and Mercié, to attempt the difficult task of portraying the one Fame, the other the Genius of the Arts, in the uncomfortable act of avoiding a hasty dismounting through the flourish of the sweeping wings. But on gems, medals and bas-reliefs Pegasus has been a favorite subject with sculptors and painters, both ancient and modern. One of the most vigorous, lifelike and artistic presentations is shown upon the reverse of a medal of the Bembi, by Benvenuto Cellini. The only record of a statue of Pegasus it has been possible to discover is one that merely mentions the existence of a statue of Pegasus and Bellerophon at Byzantium.

Archaic painted Decoration.[2]

The Genius of the Arts, over the Guichet of the Louvre. Mercie, Sculptor.[1]

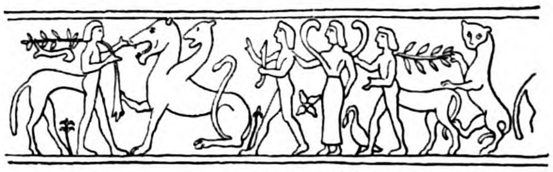
In the funeral procession of a monarch it is even in these days not unusual to lead his favorite charger, whose empty saddle adds more of pathos to the scene than does the elaborately bedecked funeral car; and it is with some Indian tribes the custom that beside the grave of the dead chief should be slaughtered the faithful beast who had shared so many of his master's dangers. In the first case we feel that the unburdened charger is one of the most impressive features of the surrounding funeral pomp, and in the other we understand that Indian superstition seeks to provide the departed chief with a speedy way of reaching the Happy Hunting-ground. The connection of this Indian custom with the manners of the ancient pagans is singularly close, and it is not unlikely that in the customs of all races who have enjoyed the service of the horse could be traced a more or less close symbolic connection between the flitting of a departing soul and the horse.

The rude cut that represents an antique bas-relief, a sculptured metope from the temple at Selinus and now in the museum at Palermo, which celebrates the decapitation of Medusa by Perseus, shows under the arm of the victim a horse — Pegasus of course, since that winged wonder sprang from the blood of Medusa, and it shows how inappreciative this particular sculptor was of the proprieties of artistic truth that Medusa is shown as a monster and not as the creature of rare but fatal beauty that the closer interpretation of the myth shows her to have been: that a beautiful horse should spring from the blood of a beautiful woman is an appropriate climax, but that a creature endowed with such beauty and intelligence should spring from the polluted blood of a monster is unlikely. Although the sculpture is not, of course, a tombstone, it has so much the air of one that


Archaic Centaur Figurines.[2]

[1] From the *Gazette des Beaux Arts.*
[2] From Müller's "*Denkmaler der alten Kunst.*"

it is a temptation to consider it among the first of the long series of sepulchral sculptures that lined the Street of Tombs at Athens, the Via Sacra at Rome, and similar avenues of the dead elsewhere, on which the horse was sometimes introduced, first because of its symbolic connection with death, and afterwards as a conventional form



Centaurs and Chimera.[1]

of decoration. In one of the most common forms, though perhaps not the simplest or the earliest, the symbolic element is represented by a horse's head in the upper corner of a bas-relief as if looking through a window from the outside at the friends of the deceased enjoying the funeral-feast within.

Perseus and Medusa. Metope from Selinus.

On, at least, one of these reliefs there is a muffled figure seated somewhat apart from the feasters which may be intended to represent the dead man for whom the horse on the outside is waiting. In later forms a greater variety of treatment was practised and the equine symbol expanded till, as on a sepulchral urn in the British Museum, it is represented by a four-horse chariot driven by a winged genius. In this last case the horses seem to be introduced amid the rather rich decoration quite as much as a piece of conventional ornament as because of its symbolic value. Another type of equestrian sepulchral sculpture is found in the somewhat noted slab or stèle which formed the monument of the soldier Dexileos, son of Lysanias, which was found in 1863 and reërected on the very spot where it was originally placed 393 years before our era. In this case the horse — Dexileos is shown as riding over a fallen enemy — was introduced either as being an appropriate decoration for the monument of a soldier who fell at the Battle of Corinth, or

Sepulchral Bas-relief. — The Funeral Feast.[1]

Bellerophon and Pegasus. — An Antique.

because of the symbolic connection between death and the horse. This bit of sculpture is of marble and still shows traces of color, while the bridle and some other portions were of bronze.

The winged Mercury who piloted the dead to Charon may have

Fresco from the Golini Tomb. The Soul quitting the Earth. — Etruscan Museum at Naples.[2]

suggested the winged steed — who was not, so far as known, employed in a similar way — and so brought about the adoption of the common horse as a funeral emblem. But some writers see in this employment of the horse only an intention to symbolize the entrance of the departed upon a journey, while in the paintings in the catacombs the horse is understood to symbolize the swiftness of life.

This connection of the horse with death makes it appear quite natural that as consolation to the bereaved parents a gilded bronze equestrian statue should have been set up in Brixia on the death of a child only in his sixth year, a fact which otherwise seems merely whimsical.

CHIRON. — Chiron, the most famous of the centaurs, was a son of Saturn, and lived on Mt. Pelion. He was instructed by Diana and Apollo, and so excelled in medicine, hunting, music, gymnastics and prophecy that the most distinguished Grecian youths were sent to him for instruction, such as Peleus, Achilles and Diomedes. Chiron was a friend of Hercules and was immortal.

THE CENTAUR. — "The gallop of a well mounted horse is still a unique spectacle, as is every equestrian exercise performed to display, in their moments of common activity and accord, the two most intelligent and finished creatures in form that God has made. Separate them, and it might be said that each one of them is incomplete; for neither of them has any longer his aximum of power: couple them, mingle the man with the horse, give to the torso originality and will, give to the rest of the body the combined attributes of promptness and vigor, and you have a being of sovereign force, thinking and acting, courageous and rapid, free and controlled. Greece imagined nothing grander or more natural. She has shown in this that the equestrian statue was the last work of human sculpture; and of the monster of true proportions, which is the audaciously represented alliance of a robust horse and a handsome man, she has made the educator of her heroes, the inventor of her sciences, the most agile of preceptors, the bravest and handsomest of men." — *From Fromentin's "A Year in the Sahel."*

THE PATRONS OF THE HORSE. — "The gods had often a liking to transform themselves into horses; so much so that the sacrifice of the god, that is, the god's death, is represented by the death of the horse. Every one knows that gods and heroes delighted in showing themselves good horsemen, or, at least, good charioteers. On this account, it would be difficult to say to which god in particular the horse is sacred. The Vedic Açvinâu, the Vedic Aurora, who wins the race in her chariot, Agnis, Savitar, Indras, victorious and splendid by means of their steeds, the hippios Passidon, the hippeia Athene, the hippodameia Aphrodite, the horsemen Dioscuri, Mars, Apollo, Zeus, Pluto and the German Wuotan (like his *alter ego* St. Zacchæus) never show themselves otherwise than on horseback; hence the horse was naturally sacred to all of them. In the Christian faith, the innumerable gods of the ancients having become innumerable saints (when they were not so unfortunate as to degenerate into devils) the horse is now recommended in its stable to the protection of several saints, from the obscure Sicilian St. Aloi to the no less modest Russians St. Froh and St. Laver, who take the horse, as well as the mule, under their especial protection, not to speak of the glorious horsemen St. George, St. Michael, St. James, St. Maurice, St. Stephen, St. Vladmir and St. Martin, especially revered by warriors, and in whose honor the principal orders of Knighthood in Europe were founded." — *Zoölogical Mythology by Angelo de Gubernatis.*

[To be continued.]

ITALIAN CITIES.[1] — III.

MILAN. — I.

Persian Sculpture from Susa.

MILAN is the first large city which one meets with in upper Italy after leaving Turin. Lombardy, of which Milan is the capital, was formerly a lacustrine region whose earliest inhabitants dwelt in huts built on piles. The Etruscans, doubtless, were the first who brought into this Cisalpine province artistic tastes and manners. Later the Gauls brought in their light-hearted and turbulent moods, their gaiety and vivacity — and of all the people who inhabit Northern Italy, the Milanese is the one, who, through the delicacy of his intelligence and the enthusiasm of his nature, most closely approaches the Frenchman. He is capable of irony, and delights in pleasantries — a rare thing on the peninsula. He thoroughly loves to eat, and does not despise the juices of the vine. He enjoys a reputation for gluttony, of which he is rather proud; and, in fact, there is a proverb which says that the Milanese always has a greasy plate and a mantle full of holes. Almost all others of his compatriots generally prefer to have a fine mantle, even at the expense of an empty stomach. The Lombard territory is well calculated, moreover, to determine in its inhabitants an immoderate appetite, for it is prodigiously fruitful, and its natural fecundity has been increased tenfold by the work of man.

Works of irrigation make it possible to obtain from its artificial meadows seven crops of hay each year. The Alps which bound the plain on the north act the part of collectors, which bring toward the plain clear and fertilizing waters. This territory is more rich in rivers than any other in Italy: the Adda, the Oglio, the Tessino, the Adige and the Mincio, to mention only the most important, traverse it from north to south, and form in their courses those admirable lakes around which there are so many agreeable summer resorts. Broad canals connect these great water-courses, which flow into the Po, and serve to distribute in every direction the means of irrigation from which the native reaps full profit. These immense works of canalization are due to the genius of the greatest architects of Italy, and amongst them can be counted the great Leonardo da

[1] From Müller's "*Denkmaler's der alten Kunst.*"
[2] From *L'Art.*

[1] Continued from No. 638, page 126.

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Vinci, who was considered almost a mad man when he for the first time spoke of connecting the Mincio and Tessino.

The monks of Clairvaux, who at the commencement of the twelfth century founded, under the direction of St. Bernard, a branch of their institution at a short distance from Milan, have contributed in large measure by their colonies and their teachings to the development of the agricultural prosperity of this territory and the multiplication in it of the means of irrigation. Thus Lombardy can be considered the real garden of Italy by reason of the importance and the quality of its products, if not because of the mildness of its climate. Cattle-grazing is here carried to its greatest development, and Lombardy furnishes butter not only for the whole kingdom of Italy, but also for a great portion of France. Even before water was used for fertilizing the ground by means of artificial canals, this province was already a great dairy country; for the historians of antiquity recount an amusing episode which took place when Julius Cæsar spread over Cisalpine Gaul with his legions. Valerius Leo offered hospitality to the conqueror, and set before him asparagus dressed in butter. Cæsar's generals, who knew nothing about this substance, but were wont to eat everything in oil, made faces at it, and one of them cried out, "What is this foul grease? We eat our asparagus in oil;" but Cæsar, overcoming gastronomic prejudices which rendered his companions in arms distrustful, ate the asparagus after the Milanese fashion and found it excellent. This tale proves that even at the table glory is never *de trop*. They say that a well-filled stomach and good digestion assure good humor, and it is doubtless because of this that the Milanese pass for being the gayest people not only in all Italy, but throughout the whole world. To them serenity is never wanting, and in order to prove this, in order to satisfy their love of hilarity, the ordinary limits are not sufficient, and they prolong by a week the duration of the carnival, so that while through the whole peninsula the people are already practising the privations of mid-Lent, at Milan they still dance and rejoice for a whole week longer.

Finally, there is at Milan a marble statue which the people designate by the sobriquet of "Man of Stone," and which, to them, is the very incarnation of Milanese wit. This statue has some analogy with that of Pasquino at Rome, which, as we know, was in past time the responsible steward of popular satire. At Milan, when any one invents an epigram against the constituted powers, he goes and hangs a placard about the neck of the Man of Stone. The next day all Milan knows the epigram by heart. The curious thing is that it is not known surely what is the origin of this statue. Some believe they see in it the figure of a Milanese archbishop, but according to the most plausible interpretation, it is a statue of Cicero, who really governed the city of Milan for some time. A thing which confirms this belief is that the statue is conceived in the purest Roman style, and that on the pedestal may be read this sentence of Cicero's: "*Carere debet omni vitio, qui in alium dicere paratus est,*" which means that when one wishes to criticise another, he should himself be free from all reproach. Here is a sentence which would render the exercise of criticism most difficult if it should be rigorously observed, and one which Cicero has been the first to not always respect, for he was more eloquent than virtuous.

The city of Milan has preserved the civic character of its past days. Its irregular and tortuous streets, its narrow places recall to us clearly the time when men huddled together as much as possible in order to make the defence of a city most easy. It has been destroyed and rebuilt on several occasions, so that there remains in the walls no trace of Roman architecture except the columns of San Lorenzo, which will be mentioned later. The finest monuments belong to the century which preceded the Renaissance, and to that which marked the fullest blossoming of the arts in Italy. The feeling which rules in them (I speak here of those of the earliest epoch) is Gothic, but it is Gothic of a sort which is already corrupted by contact with Italian feeling, and which has undergone certain alterations. The Lombard artists are the ones who introduced into the peninsula the architecture of the North. They served as go-betweens between the art of Scandinavia and the indigenous art, and this specialty so distinguishes them from other Italian artists that these latter designated them (probably in scorn) by the title of Germans.

The Cathedral of Milan is the most remarkable monument of Northern Italy, except the Church of St. Mark and the palace of the doges at Venice. So proud is the Milanese of this, and justly, that while the Venetian travelling in a distant country thinks of the Grand Canal and the Lido, while the Florentine regards the Lungarno, the Roman the Corso, and the Neapolitan Vesuvius, the Milanese thinks of the Cathedral, and heaves a sigh. The Cathedral — it is Milan itself! and if you encounter on the boulevards a stranger who wears as a locket on his watch-chain a little jewel representing in miniature a Gothic cathedral glistening with pinnacles, you may be sure that he is a Milanese.

I do not know why people have persisted up to the present time in classifying this edifice as a Gothic monument. Strictly speaking, it is Gothic because it is neither Greek, nor Roman, nor Italian. On what other reasoning can it be a Gothic monument? Here is a question to which many critics will be much embarrassed to give an answer. I know many edifices which are considered as belonging to the style which bears this name, and which, nevertheless, are as much like one another as a night-cap is like a travelling-bag.

As to Milan Cathedral, in spite of the Gothic character which I take the liberty of disputing, it is unquestionably one of the finest *chefs-d'œuvre* of architecture. The fineness of the work, the elegance of its lines, make it an agreeable and charming object. Its façade, divided into five bays by means of six pilasters which cut it vertically, has a very imposing air, although the ornamental part is very much overdone and, bearing here and there traces of the taste of the Decadence, injures the effect; but when we overlook the detail and only consider the general effect, we are surprised and ravished by the harmony which exhales from it, and especially by the air of easy grace which is given to this colossal mass by the thousands of pinnacles which surmount it, and which are dominated in their turn by the central tower, which is itself surmounted by the statue of the Virgin. Thanks to the unheard of finish of the design, the marble, chiselled, cut and pierced assumes a transparent fluidity, and seems to become a vaporous and impalpable substance. The aspiration towards Heaven, which is the proper aim of religious edifices, is here realized and in an almost supernatural manner, and the innumerable statues which people its pinnacles, and which show themselves on the turrets, give it a mysterious animation and the semblance of a mystic rite petrified by the breath of the Deity. The statues which ornament the exterior of the Cathedral are in number nearly six thousand. This figure may be taken as nearly exact. We see them everywhere; every pinnacle is terminated *en ecrotère*. If all these statues should be collected in a gallery, there would be formed thus one of the finest museums in the world, for they would serve to reconstitute the history of Italian sculpture from the fourteenth century to the seventeenth.

Milan Cathedral is Gothic in this — the severity of its interior ordonnance, which causes it to rank among the first edifices of the epoch. It must be remembered that the churches of the Renaissance did not reflect the religious sentiment as the people before the Protestant reform conceived it. Art, from the time of Raphael and Michael Angelo, gave to religion an outward fashion more agreeable, endowed with greater grace, more jocund. One would say that man had effected a reconciliation with God, and that the relation between human beings and the Divinity had become more easy, more affectionate, more loving. In the Church of St. Ignatius at Rome, where we find united all the characteristics of the Renaissance style, we can recognize more than elsewhere the distinctive signs of this new architecture, which marked a radical evolution in the human spirit. Here the divine power appears to man surrounded with pomp and light. It is enveloped with all the attributes of wealth, and seems to spread about it rest, and joyousness and gaiety, and to encourage man to hope and believe in future happiness. Before the Reform, or rather before the Renaissance, when pagan Hellenism had not yet corrupted the genius of Catholicism, the temple preserved its repellant air of severity, by reason of its shadowy and ill-lighted interiors, and it is perhaps this more than anything else which distinguishes Gothic churches from those which belong to other styles. Under the Gothic vault the spirit of God, enveloped in shadow hovers silently, and only manifests itself by those rays of light which pass through the stained windows and cast their mysterious light into the nave. In the shadows of the vault one feels there wanders the parting malediction of Golgotha; and these vast naves, supported on gigantic piers, are well arranged to shelter the meditation and dreams of the crowd which does not yet dare to raise its eyes towards Heaven. From this point of view the monuments which precede the end of the fourteenth century are very curious studies, for they afford us the image of a religion and a kind of devotion which disappeared after that date.

The body of Milan Cathedral, from the great doorway to the end of the apse, measures 148 metres and 10 centimetres, with a breadth of 57 metres. The total length of the transepts with the chapels is 87 metres. The nave is 47 metres high by 19 in width, and the total height from the centre to the feet of the statue of the Virgin which crowns the central tower, is 108.5 metres. By way of comparison, here are some figures relating to the best known religious monuments:

The Cathedral of York, burned in 1828, and which had already been rebuilt in 1075, has a length of 142 English feet, a breadth of 105 feet at the western extremity and 109 feet at the opposite end. The total height of the nave is 99 feet; the ceiling of the central tower is 213 feet from the ground. A window which opens at the extremity of the gallery, and which is entirely filled with stained-glass, is 65 English feet in height by 32 in width.

The Cathedral of Cordova, built in the year 792 by the King Abderame, is 134 feet long and 387 wide. This church contains nine naves formed by 1018 columns, the smallest of which are seven feet and the largest 11 feet and three inches high.

The Escurial, begun in 1557, to which was given the form of a gridiron, in honor of St. Lawrence, is only 51 feet in height and 637 feet in length.

In the Alhambra at Granada, an ancient Moorish fortress, the Lion Court is 100 feet square.

The Church of St. Denis, near Paris, is 335 feet long by 90 feet high. It was built in 1152 by Suger.

The famous Column of the Grand Army on the Place Vendôme, Paris, is 136 feet high.

The Church St. Geneviève, to-day transformed into the Panthéon, is also one of the most remarkable structures by reason of the vastness of its proportions. The diameter of the dome is 68 feet. The 32 columns which surround it are 34 feet in height, and the highest point of the edifice is 237 feet from the sidewalk.

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The Cathedral at Rheims, which Stendhal considers one of the most beautiful churches in France, was built in 840, and measures 430 in length by 110 feet in height.

The Cathedral at Strasbourg, which is perhaps the only purely Gothic monument on the Continent, was finished in 1275. The first stone was laid in 1015. The tower, finished in 1439, is, without contradiction, the highest bit of masonry which exists in Europe. Its height is 426 feet.

The tower of St. Etienne at Vienna is 414 feet high, four feet less than that at Strasbourg.

The tower of St. Michael at Hamburg is 390 feet.

The famous tower of Pisa measures 193 feet, but it leans toward the south about 12 feet, which gives it a mean inclination of six feet in the hundred.

St. Sophia, at Constantinople, measures 270 feet in length by 240 feet in width, from north to south. The height of the dome above the level of the ground is only 165 feet.

The legendary pyramid of Egypt, from which, according to the saying of Bonaparte, "forty centuries look down on the French Army," is 146 metres.

The flèche of the Invalides, at Paris, reaches a height of 380 feet above the ground.

The pyramid of Cholula in Mexico is only 162 feet high.

The towers of Notre Dame, at Paris, measures 240 feet in height. The total length of this church is 409 feet. It interior width at the crossing is 150 feet; the width of the nave is 40 feet. The nave of the cathedral at Strasbourg is 43 feet, and its interior length is 145 feet.

The Church of St. Paul, at London, is 500 feet in length by 169 feet in width. The height of the dome is 319 feet.

The most curious figures are those connected with the proportions of St. Peter's at Rome. The total length of the basilica, including the portico and thickness of the walls, is 660 feet. The foundation walls are 21 feet and 7 inches thick. The walls of the peristyle is 8 feet and 9 inches thick, and the peristyle is 39 feet and 3 inches in width. The interior length of the crossing of St. Peter's is 98 feet. The interior width of the nave, without the aisles and chapels, is 82 feet. The total height from the floor to the summit of the cross which surmounts the dome is 408 feet. The height of the dome under the key-stone is 249 feet. The interior height of the façade is 259 feet.

NOTES AND CLIPPINGS

The Glass Windows in England. — It is curious that England is mainly indebted to an archbishop and an abbot for the introduction of the glass window. At the commencement of the seventh century this country had no "glass-makers." At that period the windows of private dwellings, as well as of churches, were filled with linen cloth, or with wooden lattices. In the latter part of the century, Wilfred, when Archbishop of York, proceeded to effect extensive repairs in the Cathedral, at that time in a ruinous state, and he is described as having "put glass into the windows," a provision previous unknown. Possibly he derived aid from his friend and contemporary Benedict Biscop, Abbott of Wearmouth, who about the year 674 brought glass manufacturers over from France to glaze the windows of his monastery and church. The venerable Bede states that up to that time the making of glass was unknown in England. He also asserts that these French artisans not only executed the work assigned to them by Benedict, but gave instructions to the English "in the art of making glass for windows, lamps, and other uses." Five hundred years after the era of Biscop and Wilfred, windows of glass existed in English houses, but despite all that had been done to naturalize this industry, the glass was still imported from the Continent. Five hundred years later on, we hear of Venetian artists at Lambeth, under the patronage of Villers, Duke of Buckingham, engaged in making "glass-plate" for coach windows and mirrors. This brings us down to 1673. A century more finds the French making great progress in the production of large plates, in which they soon met with formidable rivals on this side the Channel. The manufacture of glass of some kind was fairly established in England more than a hundred years before the Venetian artists produced "glass-plate" at Lambeth, this early manufacture being located at Clutched Friars and the Savoy. But plate-glass was the great achievement so far as windows were concerned, and to the perfection of this branch we owe important practical results, affecting our everyday existence. — *London Standard.*

The Baths at Monterey, Mexico. — Scattered through the gardens of the Bishop palace of Monterey, are the most charming baths which furnish one of the few pleasures indulged in by these plain-living people whose pleasures are so few. Many of the baths are evidently very old, judging by their massive proportions and barbarous simplicity, but no one here seems to know their history. The bath proper is a huge basin about four feet deep with its rim raised slightly above the ground. Around this is a wide paved space, and the whole is enclosed by another thick adobe wall about eight feet high, making a circular room more than twenty feet in diameter. All around the inside are broad, low stone seats, and over one side is a trellis of grape-vine which makes a dressing-room sheltered from the sun. Baths, walls and seats are stained a soft, warm red, with patches of green moss here and there, and the room is filled with sunshine, warmth and color in such ideal combination that even Ruskin would find nothing to complain of. Another suggestion of Arcadia is in the entrance to the bath which is a simple arch in the wall with no provision whatever by the architect for shutting out observers. At present a piece of coarse linen flaps its ineffectual length over the arch as a concession to nineteenth-century modesty, I suppose. During the afternoon the baths and gardens are crowded with people. After their bath the women walk or ride home on the street-car in decidedly negligé costume, and with their long, black hair streaming in damp ripples over their shoulders, entirely unconfined by hairpins or head-covering of any description. — *Ellen M. Slayden, in Boston Advertiser.*

St. Michael's, Coventry, Restored. — The restoration of St. Michael's Church, Coventry, was practically completed recently by the replacing of the top stone of the steeple, which is the tallest of the three tall spires. The work was undertaken over three years ago, one of the earliest steps being an appeal by the late vicar through the columns of the *Times* for national help in restoring the structure. The ceremony yesterday was performed by Mr. G. Woodcock, a contributor of £10,000 to the fund, who after fixing the stone, assisted Mr. Thompson, the contractor, in replacing the weathercock, at an altitude of 303 feet. A short religious service was gone through, and there were some brief congratulatory speeches, and when the weathercock swung round with the wind the crowds who had assembled at the various points to witness the ceremony cheered lustily. There still remains some carving to be done, and the statues have to be replaced; and these and other details, such as the removal of the scaffolding, will occupy the workmen some months yet. The restoration has cost between £30,000 and £40,000. — *The London Times.*

TRADE SURVEYS

An analysis of railroad, commercial and financial statistics for the past month as compared to the same month last year shows some interesting features which are ordinarily overlooked. A rearrangement of conditions and earnings as compared to corporate properties as compared to the producing capacity of the country is rapidly increasing. The power of railroad managers has contracted and rates almost everywhere have declined. The volume of traffic as compared to a year ago is in the aggregate heavier according to the reports available, but it is the habit of those who control the publication of information of this kind to withhold much information that would be of a disturbing or disappointing character, hence it is impossible to present conclusions that conclude. Business men and financiers are obliged to accept results the correctness of which they doubt; manufacturers can see more clearly as they gather their business as they go; but money-lenders, bankers, railroad-builders and promoters of great enterprises are obliged to grope in the dark to a certain extent. The fog surrounding our business affairs is very light but enterprise is unwilling to be expended in an uncertain direction. The talk in the trade circles to-day is that with the termination of the political contest a vast amount of new business will be rushed in the market. The large manufacturers, East and West, corroborate this statement. The manufacturers fear a disadvantageous decision of this much more than they have occasion, for the necessities of the country are such as to make it practically impossible for any permanent harm to be done to our industries by any reduction of duties that can be made. The reaction apparently has already set in against even moderate reductions. A great many who theoretically favor reductions and who still believe in that policy are so mixed up with the country's industrial prosperity that they are weakening in their anxiety to see the great experiment made. The manufacturers of the Northwest or a great many of them have recently expressed the opinion that with the greater control over railroad transportation and with a better prospect for a satisfactory disposal of their crops they will be sufficiently satisfied to let other things go for the present. Manufacturers and capitalists from the North who have very recently scoured through there themselves to see what was going on. assure us that there is an undertone in the Southern States decidedly in favor of pursuing such a course as will keep mills and factories busy. If reduced duties are necessary for that end their strongest support will be given to it. Their desire is that American activity must be maintained and that they will advocate and stand by such Governmental policy as will lead to that consumation. In so deciding, the manufacturers and business men do not declare themselves for or against this or that economic policy. but they simply place themselves on practical good sense grounds and will let that pilot them to their destination. Further advices from architects and builders within the past two weeks show that an increased number of permits have been taken out and that a great deal of work will be pushed through between now and fall. As stated some time ago, house-building is being vigorously pushed and relatively more money is being expended in that direction. There is an urgent demand for tenement-houses worth from $1,000 to $2.000 in the States west of Pennsylvania than there ever has been. Chicago lumber merchants have been doing a good business throughout the Western and Northwestern States all through, and particularly of this fact nail-makers speak of this same thing.

A large amount of cast-iron pipe has been ordered recently for water-works contracts. Tank-manufacturers are quite busy now and large orders for the construction of gas-works are placed. Engine-builders are full with work for small engine and boiler construction. Saw-mill work and iron-rail manufacturers have started in recently on orders for the fall and winter. There is an excellent condition of affairs among the smaller industries. The work of completing previously undertaken contracts amounts to a good deal. The houses and shops built last year are calling for a great deal of furnishing this year. The large crops anticipated in the West have laid the foundation of confidence for the heavy winter's business. The leading clothing manufacturers of New York and Philadelphia strengthen the statement made as to the promised activity. Nearly all of them are oversold. The hosiery manufacturers would be oversold but for the extraordinary importations of hosiery and woollen goods. Those industries not affected by importations are quite busy. Even those who are affected by heavy importations are gradually working themselves on safer grounds. This state of affairs is indirectly of benefit to the people at large who profit by the disturbed condition going on in all our railroads and among money lenders in the employment of their money. The financial reviewers overlook these benefits because they keep their eye upon the advantage of the mill-men or manufacturers and overlook the benefit that a great body of the people derive from the vigorous operation of the losses of trade and commerce.

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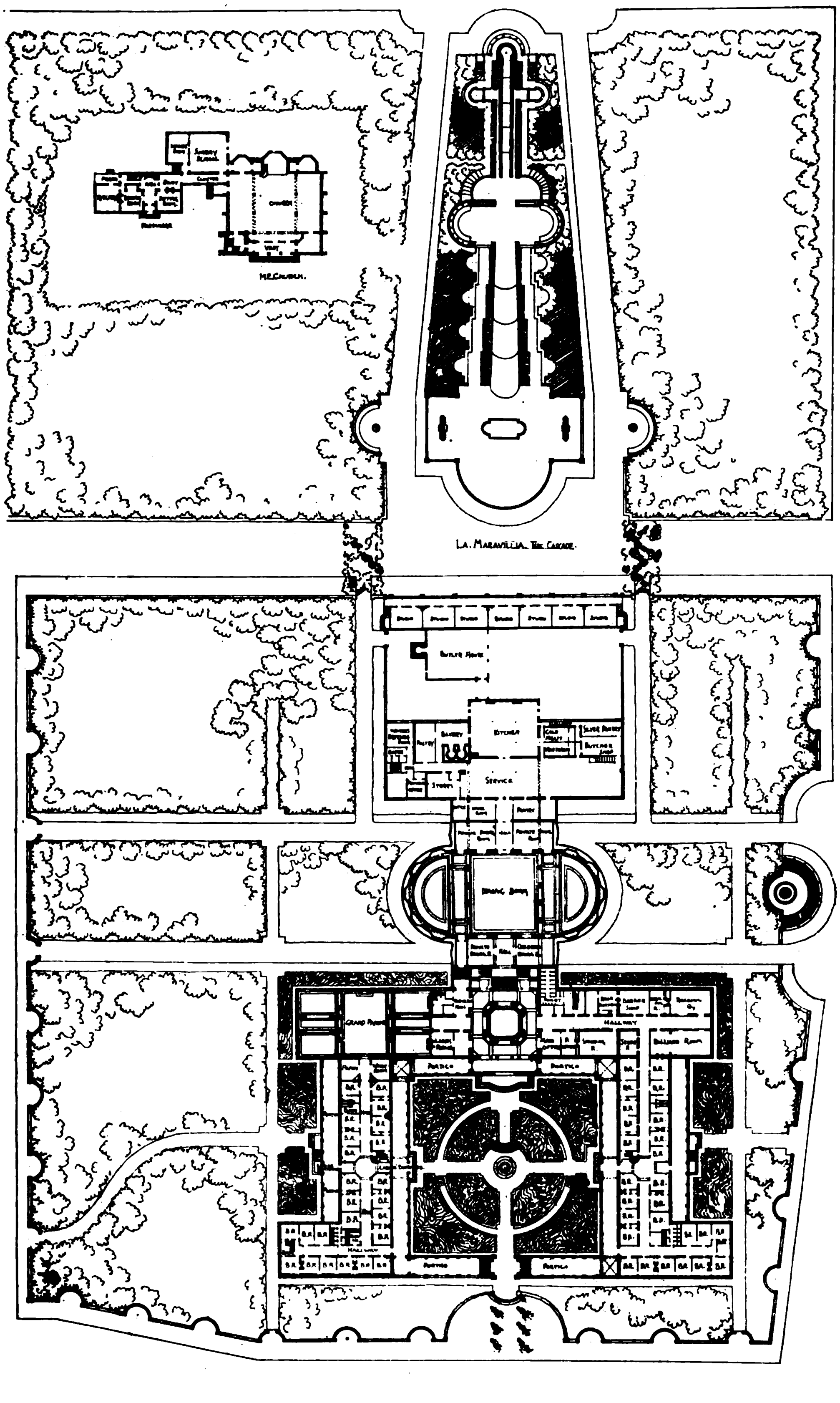

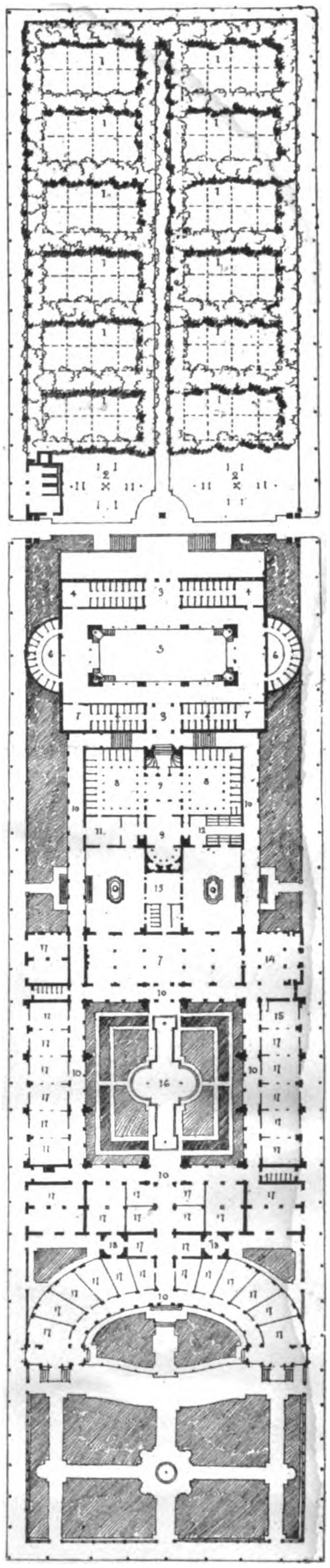

ALCAZAR:

1 Tennis Court.
2 Croquet Court.
3 Vestibule.
4 Dressing Room.
5 Salt Water Swimming Bath.
6 Sulphur Bath.
7 Linen Room.
8 Lounging Room.
9 Turkish Bath.
10 Arcade.
11 Massage Room.
12 Russian Bath
13 Smoking Room.
14 Office Hall.
15 Baggage Room.
16 Fountain.
17 Store.
18 Tower.

PLANS: OF: HOTEL: PONCE: DE: LEON: CASCADE: AND: M.E.CHURCH:

CARRERE AND HASTINGS, ARCHTS N.Y. AT ST. AUGUSTINE, FLORIDA..

Heliotype Printing Co. Boston

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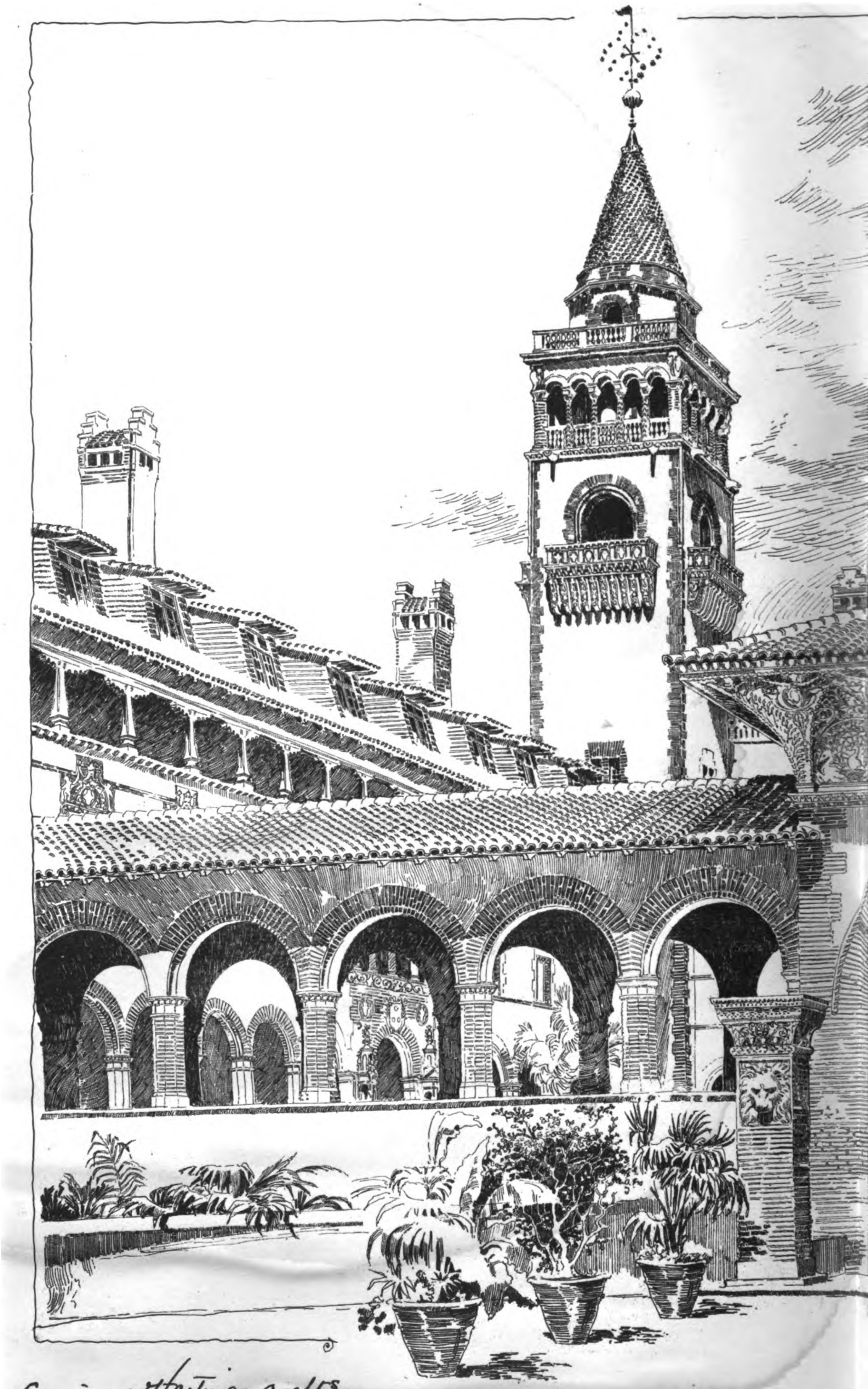

Carrère & Hastings archts.
Bowling Green New York

Entrance to the Court-Yard of the Po

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Tower, Dome and Terrace of the Hotel Ponce de Leon.
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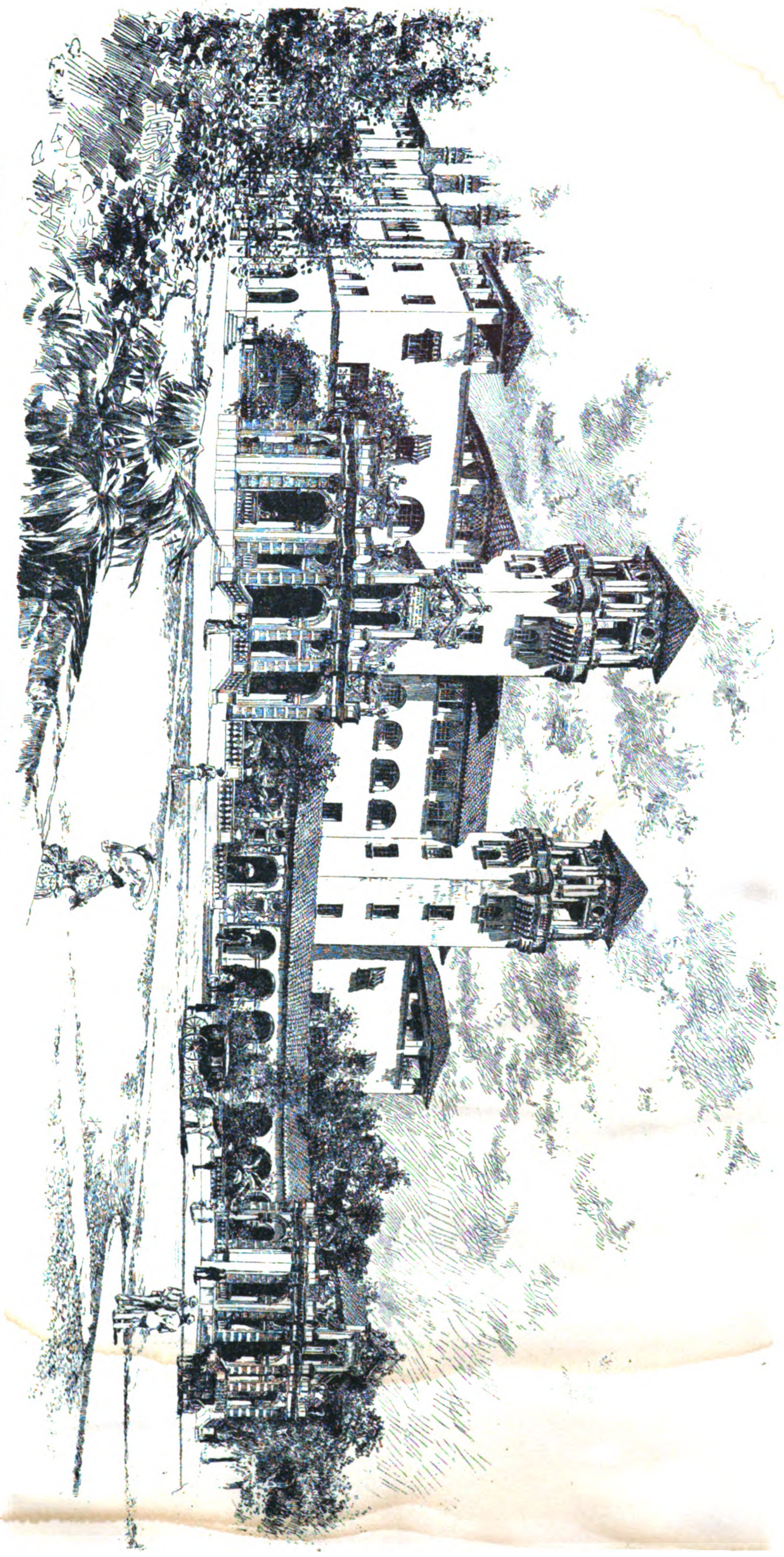

Carrère & Hastings, Architects
New York

THE ALCAZAR—ST. AUGUSTINE, FLORIDA

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AMERICAN ARCHITECT AND BUILDING NEWS, AUG. 25 1888 No. 661

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HOTEL PONCE DE LEON—ST. AUGUSTINE, FLORIDA

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The exterior of this house is stained with
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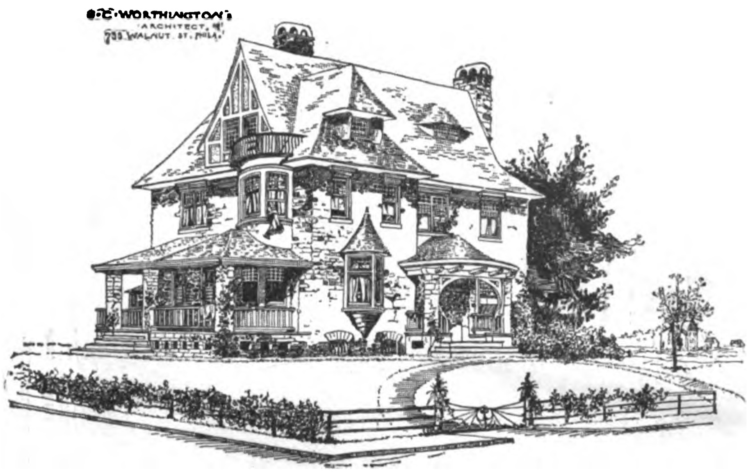

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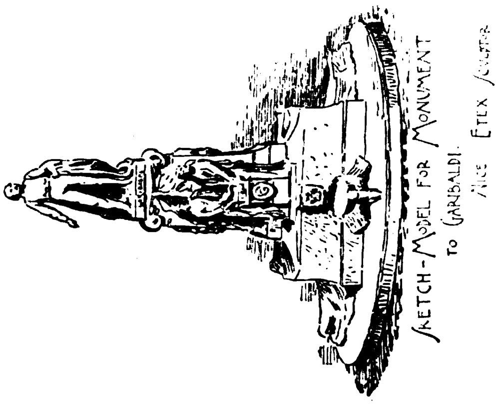
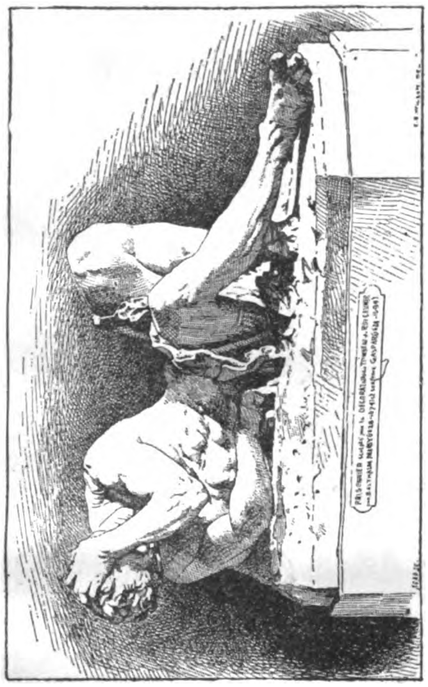
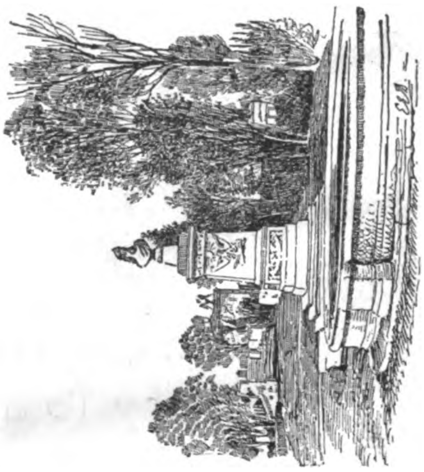


Sketch-Model for Monument to Garibaldi. Nice. Etex Sculptr.

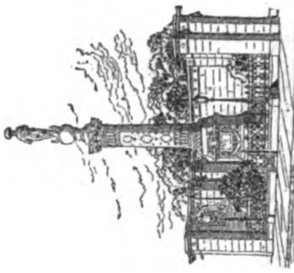
Statue of Fame.
Modeled by Dejoux to surmount the Dome of the Pantheon, Paris, but never ... in Bronze ...



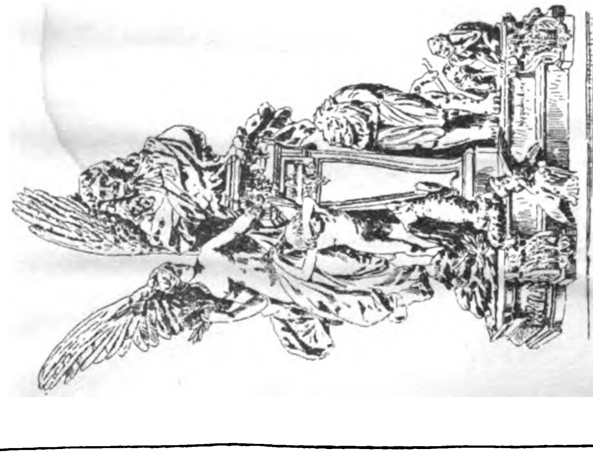
The Prisoner, From L'Art.



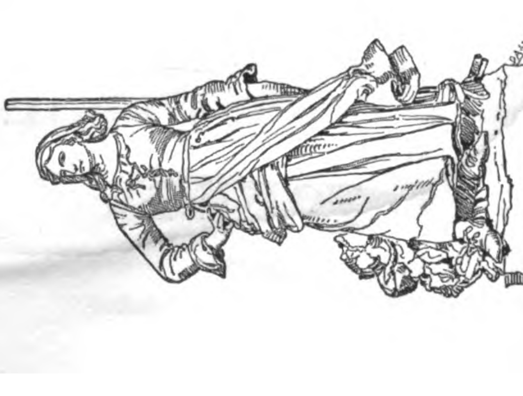
Bust of Cuauhtemoc, Mexico.



Monument ... Marseilles France ...



Design for the Monument to La Fontaine to be erected in Paris



Statue of Jacqueline Robins. St. Omer, France. Lorimer Sculpt.

FIGURE SCULPTURE.

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THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIV. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 662.

SEPTEMBER 1, 1888.

Entered at the Post-Office at Boston as second-class matter.

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THE Western State associations of architects show generally a very gratifying degree of activity, and there are indications that many of the reforms and advances which we look for in professional life in this country are likely in future to be originally proposed and discussed in the local organizations, and perhaps tried by them in practice, before they are finally adopted by the great representative bodies of the profession. The meetings of these societies are not too frequent, and are made as attractive as possible, so as to call out a large attendance, and as the members soon form a somewhat intimate acquaintance with each other, any new scheme is considered, first privately, and then officially, with a freedom and thoroughness which is not possible at conventions of the great associations. The Illinois State Association has just taken up with vigor the important question of protective organization, and we hope will be able to accomplish something before the meeting of the two conventions in October and November next, which those conventions may find of great use. We are inclined to think that for the purpose of professional protection although the meeting of the State Societies are the best places to discuss the matter in, an organization embracing the whole country would be more useful than a number of local ones. The prosecution of such duties would soon bring in a mass of precedents, legal suggestions, and experience, which would be far more valuable in the hands of a single body than if scattered among the records of the Executive Committees of twenty State Associations, with, probably, an amount of repetition, and a diversity of arrangement, which would make it impossible ever to collect and digest the material for the common benefit. Moreover, while the amount of business to be transacted by a State Protective Association would probably only be enough to require a quarterly or semi-annual meeting of its officers, and the dues collected, unless made oppressively high, would hardly furnish fees which would induce the ablest lawyers to undertake the trouble of studying thoroughly questions so technical and so strange to them as those involved in architects' cases, a national organization, judging by the experience of that existing in France, would have enough business to keep one or two first-rate lawyers interested in its work, and as it would have sufficient income to pay them suitable fees, they would be glad to acquire the special knowledge which would render them most useful to their clients. How valuable this knowledge would be in shortening the duration of trials, in selecting witnesses, citing cases, and making explanations to judge and jury, those architects who have had suits of their own, or have testified as experts in those of others, will readily understand, and, besides its superior facilities for commanding the services of counsel thoroughly versed in building matters and architectural practice, a national association, by its higher prestige, and its more impersonal quality, would, we think, gain more respectful attention to its representations than would be accorded by most oppressors of architects to a body composed of their own fellow-citizens.

A CHURCH tower fell in Washington lately, under circumstances which will make the investigation of the causes of the accident very interesting. The church was a new one built of stone, and furnished with a square tower, one hundred and fifty-eight feet high. At the ground-level the tower was pierced with openings on three sides. The main part of the building was almost entirely completed, and the tower was ready for the roof, when cracks appeared in the cut-stone water-table of the tower, and in the main wall of the church near the tower. The architects were notified, and on examination, concluded that the cracks in the water-table were due to the settlement of the backing, which showed signs of having forced out the water-table in front. To remedy this, the joints above and below the water-table were sawed out, to allow a slight settlement of the facing, and no further movement showed itself until a few day's ago, when the workmen on the building noticed fresh cracks. The only person to whom these indications seemed important was the watchman, who made up his mind that the tower was about to fall, and stationed himself on the opposite corner of the street to see the catastrophe. After waiting nearly all night, the tower actually fell, fortunately for him, instead of bending outward, it collapsed vertically, the stones not falling beyond the sidewalk line. A portion of the adjoining wall of the church, and of the roof, was demolished, but the damage was comparatively slight. The cause of the accident seems quite uncertain. Although the piercing of the lower walls of a tower in careless or ignorant hands is often dangerous, the strength of the piers remaining had in this case been calculated accurately, and a large surplus of strength allowed, and if, as the Washington *Star* reports, the lower part of the tower still remains intact, there can be no question as to the sufficiency of its supports. In this case it seems probable that the accident should be laid to that fertile source of mishaps with stonework, the unequal settlement of the face and backing of the walls in the middle portion of the tower, but, until the ruins are cleared away, no definite explanation can be offered.

THE New Orleans *Picayune* has a new theory about building laws. After quoting at some length the provisions of the building regulations of Berlin, apparently without the slightest suspicion that nearly all the large cities in the Northern and Middle States have similar ones, it proceeds, with the lofty scorn which used to animate our politicians of forty years ago, to say that "Monarchical and despotic governments appear to concern themselves a good deal with the private affairs of their subjects. Republican governments properly concern themselves chiefly with levying taxes and enforcing their collection. In matters of personal protection the people must take care of themselves." According to this doctrine, if a man wishes to build houses in such a way that they fall down on the heads of the passers-by, or to arrange his drain-pipes so that they poison his neighbors, or to plan factories and school-houses with a view to having the persons in them compelled to jump out of the upper windows, in case fire breaks out in the basement, he must not be interfered with, as these are private affairs, with which only monarchical and despotic governments meddle. "In matters of personal protection," in the land of the free and home of the brave, "the people," we are told, must take care of themselves, by wearing iron helmets, and germicide respirators, and asbestos garments, we suppose, and the government should content itself with applying the screws to the tax-payers, to raise funds for buying votes and enriching the members of the ring. We do not know how it may be in Louisiana, but in this part of the country the republican government have brought the art of "levying taxes and enforcing their collection" to a point which would provoke a revolution within a year in most "monarchical and despotic" countries, and, at the risk of seeming to the *Picayune* "un-American," if not, indeed, suborned by monarchical and despotic gold, we cannot help thinking that the practice of utilizing some of the surplus energy left after collecting the taxes in looking out that the people who pay them are not slaughtered with impunity by greedy builders in theatres, tenement-houses, hotels, factories and school-houses is one quite worthy of the government of a free community.

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THAT interesting publication, the form of contract "adopted by the Joint Committee of the American Institute of Architects, the Western Association of Architects, and the National Association of Builders," has just been issued, and is probably by this time in the hands of most of our readers. The specimen copies sent to architects are accompanied by a circular, which requests the adoption of the form in the practice of the recipient; and an arrangement has been made with the Inland Publishing Company, of Chicago, for furnishing the blanks, with or without the insertion of the name of the architect ordering them, at a very moderate price, copies without inserted names being sent, free by mail or express, for eight dollars per thousand, well printed on good paper. In general, the work of the Joint Committee deserves the highest praise. We must confess to having had some misgivings, after reading the circular of a year ago or more, in which the Master-Builders' Association described its views on the subject of contracts, lest the form adopted should introduce novelties of a kind very inconvenient to the architect, and unpalatable to the owner; but the architects on the Joint Committee have taken good care, not only of professional interests, but, as it appears of those of owners; and although, if the owners had been represented on the Committee, we imagine that they would have claimed some of the authority given by the form to the architect, their rights have been so carefully defined and guarded that they may well believe that their exclusion, for instance, from the privilege of ordering extras, is intended, not, as Lord Grimthorpe thinks, to enable the architect to run riot at his employer's expense, but to enable the former as the medium through which orders for extras must come, to keep them properly recorded, and to estimate the value of them intelligently, without the confusion, and, in many cases, the serious losses to the owner, which follow from conflicting directions given, or pretended to have been given, by architect and owner independently to a crafty contractor.

IN one or two respects we think the form might be improved, or, we should more modestly say, we do not see the advantage of the variation which it presents from the ordinary model. In its first clause, the agreement provides that the contractor shall "well and sufficiently perform and finish" the work required, "under the direction and to the satisfaction of the Architect, *acting as agent of said Owner.*" We suppose that the Joint Committee must have had good reasons for inserting the words which we italicize, but it seems to us that very good ones ought to be necessary for incorporating in a building contract an admission that the architect is the agent of the owner, as against the contractor, instead of being, what the law presumes him to be, a learned and impartial judge between them. The courts are frequently called upon to consider arguments offered by counsel for contractors who wish to get paid for work which the architect refuses to accept, to the effect that the architect is the agent of the owner, that the law forbids any man to be judge in his own case, and that as, on this principle, an owner cannot avoid paying for work done for him on the ground that it is unsatisfactory to him, the certificate of his agent, being his own certificate, is not conclusive as to payments to be made by him. To this the usual answer of the judges is that the architect is not the agent of the owner in this matter, but an independent expert, who is presumed to decide fairly between the parties, and whose award cannot be regarded as the act of the party who wishes to avoid payment; and on this ground the certificate has almost invariably been sustained. If, now, the accepted form of contract expressly declares that the certificate of the architect is given, not as the opinion of an impartial man of science, but as the device of the agent of a person who presumably wishes to escape from paying his debt, although the clause can be enforced just as one might be enforced which demanded the certificate of the owner himself as a condition precedent to payment, it seems to us likely to be regarded as violating the spirit of the law, and to be set aside on the smallest pretext, greatly to the detriment of the dignity and authority of our profession.

THE last Bulletin of the French Architects' Protective Society shows that its work is increasing, and its influence rapidly extending. It has now more than two hundred members, including the most distinguished men in the profession; it defended the interest of its members last year in four suits, two of which were carried through successfully, while the other two are still in court; and its aid has been invoked in six new ones, which have not yet reached the stage where their circumstances can be made public, but which, we are told, involve two or three questions of great professional importance. One other case, involving the ownership of drawings, which has been long in litigation is now decided, and the architectural community will hear the result of the trial with much interest. It seems to be considered hopeless in France, as in England, to try to open the eyes of courts to the fact that clients do not pay for drawings, but for professional services in which drawings are instruments; but this was a peculiar case, in which the Society saw an opportunity to gain a point in the struggle for architects' rights in the matter, and took up the contest with a zeal which deserved success. It seems that an architect was invited to take part in a limited competition for a group of schoolhouses, the cost of which was restricted to eighty thousand dollars, while the execution of the work was promised, at the usual compensation, to the successful competitor. The applicant for the Society's aid was placed second by the professional judges, but it was proved that his design was the only one which could be carried out within the limit of cost. Before anything was done toward executing the design, the town elected new officials, and the whole project was forgotten by every one except the architect. After waiting awhile, he sent in his bill for services, and was refused payment. He brought suit, and recovered twelve hundred dollars, being one and one-half per cent on the proposed cost of the work. His drawings had been returned to him, and before the town officers would pay him what the court had awarded him, they demanded that the drawings should be given up. The architect declined to part with them, and the town then applied to the court to know whether the award of damages did not imply the surrender of the plans. The lower court held that it did, and an appeal was taken to the Council of State, which decided last month that "As the damages awarded represented the architect's remuneration for his work, by paying them the town became proprietor of his drawings," and decreed that they should be given up.

MR. E. R. ROBSON, the distinguished author of the best work on School Architecture ever published, and until recently architect to the London School Board, has been drawn into a controversy with the Board which is of great importance to the profession. Some time ago, under Mr. Robson's direction, an important group of school buildings was erected on Broad Street in London. Lately, cracks appeared in the walls, and on investigation it appeared that the concrete footings were of bad quality, and that much less concrete had been put in than the specifications called for. Thereupon, after the usual fashion of boards and committees, instead of applying for redress to the constructor who agreed to put in the foundation according to the specification, and got paid for doing so, the Board left him to enjoy his ill-gotten gains in peace, and made a formal demand on Mr. Robson to take the amount out of his own pocket, and hand it over to them, on the ground that, having certified that in his opinion the contractor had completed his agreement, it was for him, in case his opinion was a mistaken one, to make good the contractor's fault at his own expense, while the contractor might keep the money which he had not earned, without being even asked to return it. In Mr. Robson's case, the hardship, or rather, the insolent brutality of the demand was enhanced by the fact that in the discharge of his duties as architect to the Board he was called upon to carry out so many buildings that it was utterly impossible for him to give personal inspection to all of them. This was perfectly well understood by the Board, which appointed a clerk-of-works for the express purpose of seeing that the specifications was carried out, and in addition to this officer, an Inspector of Works, which appointment was made on the distinct ground that Mr. Robson's time was so valuable to the Board for other purposes that he ought to be relieved of the bulk of the work of inspecting buildings in progress. The School Board does not deny this, but claims that by signing a certificate for payment, relying on information brought him by the agents appointed by the Board for the purpose of furnishing him with such information, he rendered himself personally liable to make good all faults which the Board's agents should fail to discover in the work of the Board's contractors. The *Builder* pronounces this claim "morally absurb," and believes that it will be found "legally intenable" and we trust that the event will prove it so.

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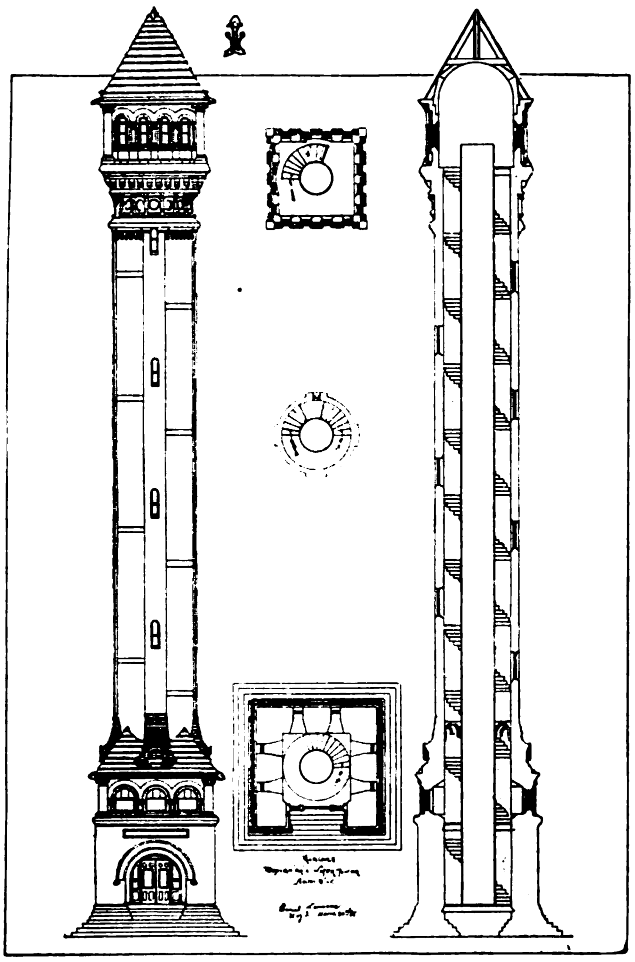
ARCHITECTUAL EDUCATION IN THE UNITED STATES.[1]
II.

THE UNIVERSITY OF ILLINOIS.



Water-tower designed by a Student at the University of Illinois.

THE University of Illinois is an institution which was organized under the same conditions as Cornell and the Institute of Technology, although it differs from both of them in being practically a free school. It is located at Urbana, Ill., about one hundred and twenty-five miles south of Chicago, lying near the boundary lines between the cities of Champaign and Urbana, which together have a population of some eight thousand. The University was opened in 1868, and at that time had a nominal department of architecture, which, in the fall of 1869, was placed under the direction of Mr. James Bellangee, a graduate of the Science-Department of Ann Arbor University. Mr. Bellangee had worked for some time in an architect's office in Chicago, but, we believe, had had no special technical training. The special instruction afforded by the course was limited to architectural drawing, descriptive geometry and projection drawing. In 1871 Mr. Harald M. Hausen took charge of the department. He was a graduate of the School of Architecture in Christiana, Sweden, and had studied two years at the Bau Academie in Berlin. He remained at the University for only a year, and did little to establish the department. Mr. N. Clifford Ricker, the present incumbent of the chair of architecture, was at that time a student in the so-called architectural course under Mr. Hausen, a course including a few engineering branches and a very slight smattering of drawing and design, excellent of its kind, but very limited in extent. During 1872 Professor Ricker studied in the office of J. W. Roberts, architect, in Chicago, a pupil of Mr. Richard Upjohn, and in the fall of the same year assumed charge of the Architectural Department at the University. The next summer Professor Ricker went to Berlin where he entered the Bau Academie as a special student, and afterwards travelled in Europe. The department of architecture has since that time been developed entirely by his individual exertions, and he has been almost alone in the work, the funds of the University not allowing him a very generous amount for equipment, photographs, etc., especially as the attendance has always been rather small.

It would hardly be worth while to consider in detail the growth of the system of instruction from the condition under which Mr. Hausen left it to its present state, and for the purpose of comparison with the other colleges it will be sufficient to consider the course of studies as it now exists. According to the by-laws of the University, the studies are elective in the sense that a student may pursue a selected course and graduate from the University, becoming an alumnus; but a prescribed course is rigidly required for a degree. The course in architecture, as at present laid down, extends through four years; but this requires so much time, and so many draughtsmen and young architects are unwilling to spend four years in this kind of preparation, that the trustees of the University decided to establish a special course for those who do not desire to take up all the technical studies. This is known as the Builders' Course. Candidates must pass examinations in the common branches, but not in the studies of the preliminary year, unless they desire to pursue other studies later on. The Builders' Course is as follows, occupying a single year of three terms:

1. Wood Construction. Projection Drawing. Shop-Practice (Carpentry and Joinery).
2. Stone, Brick and Metal Construction. Architectural Drawing. Shop-Practice (Stair-Building).
3. Graphical Statics. Architectural Designing. Shop-Practice (Cabinet-making).

This course is evidently quite superficial in its nature. Unfortunately, it finds many followers, though the number is, we believe, decreasing from year to year.[2]

The regular course of studies is as follows:

FIRST YEAR.

1. Trigonometry. Projection Drawing. Shop-Practice. French or German.
2. Analytical Geometry. Descriptive Geometry and Lettering. Shop-Practice. French or German.
3. Advanced Algebra. Graphical Statics. Shop-Practice. French or German.

SECOND YEAR.

1. Elements of Wood Construction. Calculus. Free-Hand Drawing and Modelling.
2. Elements of Stone, Brick and Metal Construction. Advanced Analytical Geometry. Architectural Drawing and Designing.
3. Elements of Sanitary Construction. Advanced Calculus. Water-color Sketching.

THIRD YEAR.

1. Architectural Drawing. Analytical Mechanics. Chemistry.
2. History of Architecture. Resistance of Materials. Physics.
3. History of Architecture. Advanced Descriptive Geometry. Physics.

FOURTH YEAR.

1. Esthetics of Architecture. Architectural Perspective. History of Civilization.
2. Architectural Designing. Heating and Ventilation. Constitutional History.
3. Architectural Designing. Estimates, Agreements and Specifications. Political Economy.

In order to more clearly appreciate the relative importance given to the various branches, a summary may be of interest, as follows:

Under the head of pure mathematics we find that trigonometry, geometry, algebra and calculus together occupy 360 hours. Applied mathematics, such as descriptive geometry, graphical statics and resistance of materials occupy 480 hours; theoretical study of construction occupies 336 hours; languages, limited to either French or German, have 180 hours; the theory of architecture, including history, esthetics, and lectures on color and the like, has 360 hours; drawing occupies 960 hours; shop-practice 360; and a few side branches, such as chemistry, physics, political economy, etc., together take up 384 hours; making the total number of hours for the whole course 3420. It will be seen by this summary that 28 per cent of the time is given to drawing, and 31 per cent to studies which are purely architectural in their nature, including the shop-practice, so that altogether 59 per cent of the students' time is occupied entirely with architecture, while 41 per cent of the entire course is given to studies which do not bear directly upon the profession in one way or another.

Let us now consider the method in which the instruction is communicated to the pupil. The first purely technical exercise of the student is shop-practice, which comes into the first year of the course. Shop-work was introduced into the University by Professor Ricker, in 1873, after having made some investigation of the Russian system as illustrated at the Vienna Exhibition. This was the first

[1] Continued from page 49, No. 658.

[2] Prof. Ricker writes us as follows: — "The Builders' Course is primarily intended for the benefit of mechanics, who have long left school, cannot spare the time for preparing for the required entrance-examinations to the University, or for young men with imperfect preparation, who wish to learn a trade afterwards, and the students in this course have been almost wholly drawn from these two classes. The number taking the Builders' Course rarely is one-fourth that of students in the Architects' Course, though now twice that in any previous year. To guard against abuse of this course and prevent it from becoming a kind of bye-pass around the entrance examinations, three restrictions are provided:

1. A tuition fee of $5 per term is required.
2. Members of the class rank as preparatory students.
3. Attendance is strictly limited to a single year and to the studies of the prescribed course only; should a student wish to take other studies or remain longer, he must pass the full examinations and matriculate.

I think the effect of the course has been good.

1. Most of these students are skilled mechanics, who wish instruction in the most essential branches, and it should be provided for them in this State University.
2. Most become foremen or builders, very few draughtsmen or architects. So I think that we avoid most of the evils of the two years' or special courses as pursued in other colleges."

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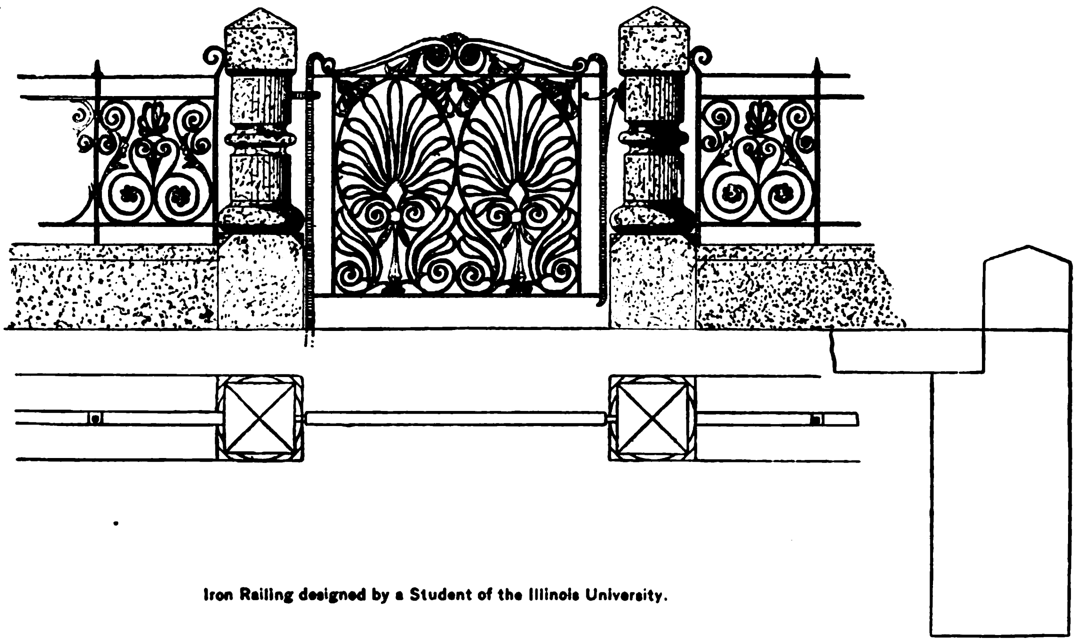
use of the system in a school in this country. The practice at the shop during the first term includes all of the ordinary roof-carpentry and joining work, such as trussing, planing, splicing, joining, dovetailing, etc., the work being done on pieces about one foot long and two inches square. In the second term attention is given to cabinet-making, with glued joints, bead-work, chamfers, inlaid-work and turning. In the third term the student is employed in the construction of models of roofs, towers, window, door-frames, etc., to scale and from drawings, to give him some knowledge of general construction. During the last of the term some attention is given to stone-cutting by the help of plaster-blocks, three or four pieces being worked up in the ordinary methods of dressing stone. Professor Ricker says he does not feel entirely satisfied with the way in which this work is handled in the shop, and hopes, eventually, to have real stone and stone-tools to work with. This shop-practice is practically several degrees better than what one would get by apprenticing himself to a regular builder, at least so far as concerns mere handicraft, although, of course, students in the shop can get no idea of the mechanical construction of a large building.

As a necessary and natural sequence of shop-work comes the study of theoretical construction occupying the greater part of the second year. This is illustrated with models, photographs, etc., the lectures being type-written by the department on prepared tracing-paper and blue-printed, so that each student can have copies of the lectures by paying for the cost of the blue-printing, which the University does at the rate of one and a quarter cents per page, making for the entire work a cost of about three dollars and sixty-five cents. A pupil often uses a copy and then sells it to a member of the next class. Each student in the class, however, is obliged to possess a copy. The lectures are not delivered orally, but specified portions of the topic are assigned for each day, and the students are required to post themselves and be ready for recitations. The study includes the consideration of materials, seasoning, shrinkage, dry-rot, various kinds of lumber, strength of materials, joints and fastenings used in carpentry, methods of construction of framings, walls, ceilings, trusses, groined-work, roofs, etc., in fact all that has to do with carpentry in construction. In the first term's work the student is required to make twenty plates in illustration of the topics, selecting from definite topics given out. In the second term's work some time is given to the study of stair-building in so far as relates to the general principles of planning, and students are admitted to a special course for working-out the constructive details of stair-building, though this is purely optional. In the latter part of the term's study, brick construction is taken up and discussed in its various details, also the subject of foundations, iron and steel as materials for building operations, stonework, tiles, terra-cotta, etc., and corrugated-iron. All the recitations, which are drawn directly from the professor's written notes, are supplemented by practical problems in which the student has to use his knowledge and show that he appreciates what he has been reciting.

Closely involved with the theory of construction is that of sanitary engineering in the third term of the second year of the course. Paul Gerhard's "*Drainage and Sewerage of Buildings*," and Staley's "*Separate System of Sewerage*," are used as text-books, with lectures by Professor Talbot, the assistant in engineering. This study occupies only half of the term, the remainder being given to practice with civil-engineering and surveying instruments.

The instruction in drawing is naturally one which is bound to receive the most attention. A certain facility in drawing is presumed to be possessed by the pupil before entering the University, though practically it is found that the student knows little more than how to hold his tools. Architectural drawing, as such, does not enter into the course until the second term of the second year, though in the first term of the second year time is allowed for a certain amount of free-hand drawing. It should be said, by-the-way, that all of the free-hand drawing taught in the University, is under the direction of Professor Ross, a graduate of the Normal Art School of Boston, who has been doing some excellent work in Champaign, and has built up a very interesting department there.



Iron Railing designed by a Student of the Illinois University.

In architectural drawing, as such, a start is made by using Tuthill's "*Architectural Drawing*" as a text-book, the student being required to work up one set of drawings each term. During the second year, in case the student has had previous experience, he is allowed to draw out some building in elevation from some published perspective, or if far enough advanced, is instructed in simple tinting and etching with a pen. Perspective is taught by the use of Professor Ware's text-book, practice being obtained by working out four or five examples which are given by the professor. Of course, it is very difficult to develop a great deal of architectural ability in a student in the course of two terms of architectural drawing. The University does not profess to make finished draughtsmen, but to show the way and lead the student to work on his own lines, the time being so short that is given to the study, as such, though in subsequent terms a great deal of architectural drawing will naturally work into the course, if the student is at all ambitious, and as a fact most of the students do a great deal more architectural work than is strictly required by the curriculum.

Following this, the student is given some practice in architectural designing, though this comes only in the last year of the course. During the second term of the fourth year six problems are given to each student beginning with a small detail of a building, and working up to a small problem of an entire structure. In the third term, the last of the course, a single large problem is given each student, and this is worked out fully, with all necessary drawings and an outline of specifications, just as if it were an actual problem in professional practice.

It generally happens that students, if they become interested in the course, will begin the designing earlier than the senior year, and so a great deal more work will be accomplished in this direction than would be inferred from the list of studies.

Lectures on the history of architecture are written out and blue-print copies are made the basis of the instruction, supplemented by reading of various standard authors and discussions of essential points. For purposes of illustration Professor Ricker uses a large collection of mounted engravings, photographs, etc., drawn from all possible sources, arranged in architectural sequence and brought in with such lecture as may be necessary. In order to fix in the students' minds the distinction in style, each one is obliged to make during a term five plates or tracings of architectural details. The students are at liberty to select what details they will trace, but the University retains the tracings and furnishes the pupils blue-prints of the same at a cent and a quarter per sheet, so that each student can have at a very slight outlay a very valuable assortment of tracings illustrating the lectures he has been studying. The lectures on the history of architecture are written out and blue-printed in the same manner as the lectures on construction, and each student is obliged to have an entire copy of the lectures for the year.

For the students of esthetics a translation has been made by Professor Ricker, of Redtenbacher's "*Die Architektonik der Modernen Baukunst.*" The translation is blue-printed, and the students provided with the prints which serve as the basis of the recitations. In the same way a translation of Planat's "*Chauffage et Ventilation des lieux Habités*" is used for the study of heating and ventilation. Each of these topics is supplemented by practical problems, worked out by the students.

Six weeks are given to a consideration of estimates, based upon Vogdes's "*Pocket-Book*," and supplemented by blue-printed lectures, some thirty problems being worked out by the pupil. Two weeks more is given to agreements and specifications, the student being required to fill out blank specifications, etc., for various special cases. A portion of the term is also devoted to the study of Professor Clark's "*Building Superintendence*."

The students are not advised to do outside office-work until their junior vacations. It has been found that the students have to be handled very tenderly, as they are so apt to become discouraged with the study of purely technical branches, and it is hard to make them appreciate the necessity of schooling in architecture. At present

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there are no requirements made of students in the way of vacation work.

In regard to the equipments of the school, there is still a great deal to be desired. Professor's Ricker's department is known as the School of Architecture of the College of Engineering, and it forms but a small branch of the University proper, so that it has been very difficult to make the trustees appreciate the necessity of providing proper endowments and equipments for the architectural department of a University, which in the beginning was intended to be chiefly an agricultural college. Professor Ricker has, however, fought nobly and evolved a great deal out of a very little. The Architectural Department has a number of rooms in the upper story of the main University building, and for shop-work occupies the greater portion of what is known as the Mechanical Building, a structure devoted on the ground-floor entirely to shop-work, the upper story being one large room used as a drill-hall. The University library is fairly well equipped with architectural books. All of the leading publications are represented, and many of the less noted ones. For periodicals the department receive Daly's *Revue Générale*, the *Builder*, the *Engineering and Building Record*, the *American Architect*, the *Decorator and Furniture*, the *Art Amateur* and the *Portfolio*, London. Besides these, there is quite an extensive collection of photographs, which are kept in the lecture-rooms, where they are readily accessible for lectures. The department is benefited by its proximity to a very fair collection of casts, presented to the University by citizens of the adjoining towns, comprising specimens of the best sculpture from all the European galleries. Professor Ricker has also at his disposal a collection of casts presented by the Spanish Government, and another of casts of various architectural details from Lehr, of Berlin, together with models of ceilings, roofs, trusses, etc.

Applicants for admission to the School of Architecture are required to be over fifteen years of age, and to pass examinations in grammar, arithmetic, geography and history, as well as algebra, geometry, physiology, botany, natural philosophy and rhetoric. There does not appear to be any other limitation of age for attendance at the University, although we believe the average age of the graduates is about twenty-one. The number of pupils in the Department of Architecture is at present forty-four, including those who are following special courses. Of the graduates about half have remained directly or indirectly connected with architecture; one-quarter have gone into building operations as contractors, and the rest have abandoned the profession entirely. There have been twenty-four graduates in all, thus far, without counting some thirty special students who have gone out and since followed definite lines of architecture, and about fifteen or twenty who have gone into building, making in all nearly seventy-five graduates or ex-pupils of the department. This does not include students in the Builders' Course. The students come almost entirely from the West, and very few of them ever leave that section of the country.

The degree of Bachelor of Science is given to those who complete either of the courses of study in the College of Engineering, and a post-graduate degree of Master of Architecture is given on the recommendation of the Professor and preparation of a thesis.

In regard to the expense of attending the University, the tuition is free. Upon entering the University, however, the student is obliged to deposit a matriculation fee of ten dollars, and beyond this there is a fee for incidental expenses of seven dollars and a half per term. In the Builders' Course the tuition is five dollars a term in addition to the incidental fee. For the shop-work there is no charge whatever, not even for the material which is used. According to the estimates made by the University authorities, the maximum annual expense, exclusive of books, of a residence of thirty-six weeks at the University is somewhat less than two hundred and fifty dollars. In practice very few students go through on so little as this, and we believe the average is considerably higher, though there is no necessity for a student's expending more than three hundred or three hundred and fifty dollars per year. Twelve hundred dollars ought to carry a student easily through the entire course.

FIGURES OF THE TOWER BRIDGE. — The following technical description of the new bridge, which is rising east of the city under the direction of the corporation, and comparison with London Bridge, will interest, we believe, a considerable portion of our readers: Total length of bridge, 940 feet; total length of bridge and approaches, 2,640 feet; opening span width, 200 feet; opening span headway, when opened, 135 feet; opening span, headway, when shut, 29 feet 6 inches; side spans, width, 270 feet; side spans, headway, from 20 feet to 27 feet; width between parapets, opening span, 50 feet; width between parapets, side spans and approaches, 60 feet; steepest gradient of approaches, 1 in 40, (steepest gradient of approaches of London Bridge, 1 in 7;) depth of foundations, 60 feet below Trinity high water mark, 27 feet below bed of river; sectional area of waterway, 20,040 square feet, (London bridge, 19,300 square feet;) depth of water in opening span at high water, 33 feet 6 inches; depth of water in opening span at low water, 13 feet 6 inches. Estimated quantities of materials in the bridge and approaches — Bricks, 31,000,000; concrete, 70,500 cubic yards; cement, 19,500 tons; granite and other stone, 235,000 cubic feet; iron and steel, 10,500 tons. Machinery, etc. — Two steam pumping engines for hydraulic machinery, each 360 horse power, eight large hydraulic engines and six accumulators, four hydraulic lifts in towers for passengers; size of each leaf of opening span, 50 feet wide by one 100 feet long; weight of each leaf of opening span, including roadway and counterbalance weights, 700 tons; estimated cost, £750,000. — *The London City Press.*

A SUGGESTION FOR RELIEVING OUR CROWDED STREETS.

MANY important streets in our older cities have become not only too crowded for comfort, but so much so as to seriously interfere with their usefulness by limiting the amount of business that can be done upon them. The traffic upon a street may be considered under three heads — the street-railway, the wagons and the pedestrians.

In Boston so much has been written upon the question of the crowding by street-cars that little need be said here. The fact is that street-cars are too much of a convenience to be dispensed with. That their number might be greatly reduced by affording other and more rapid means of communication between the suburbs and the centre of the city is most probable, and there are able minds now engaged in the evolution of this means of lessening the overcrowding of the streets.

As to the overcrowding of the streets by wagons, there seems to be no immediate prospect of any invention being put in practical operation that would tend to lessen the number of them. The only well-known appliance for transporting packages in cities is the pneumatic-tube system. This if well carried out, of proper size and power, might be made to do a considerable proportion of the transportation now done by wagons. In default of some such contrivance, the most obvious remedy for this kind of overcrowding is to widen the streets, but the expense of doing so would be enormous; indeed, it is generally considered to be absolutely prohibitive.

If some of the principal streets of Boston, upon which the retail trade is now so concentrated, are not widened before long, it is probable that the bulk of the finer retail trade will gradually, and with much friction and pecuniary loss, creep out from the centre of the city into the broader avenues and streets which more liberal-minded men have caused to be laid out, radiating from the city to the south and west. There will, of course, always be a wide distribution of certain kinds of retail business, such as the supplying of provisions, but there are other kinds of retail business which it is a great deal wiser to have mainly concentrated in districts. There may well be secondary centres of retail trade, and, so far as width and convenient location are concerned, Tremont Street, beyond Dover Street, will, in all probability, be well able to meet every requirement of such a subsidiary trade-centre for all time to come. The same may be said of Huntington Avenue. The experience of New York shows clearly that the broadest streets, even when at first occupied by the best class of residences, ultimately become the minor centres of retail trade.

But the question is as to the main centre of the retail trade. By the main centre of the retail trade is meant a locality in which not necessarily the rarest and most costly goods are exclusively sold, but where the great bulk of well-to-do people, both of the city itself and of the suburbs, will always be able to find the largest selection of goods at the lowest prices. Boston distinctly has such a trade-centre, containing the largest stores and daily more crowded with people making purchases than any other part of the city, but it is so crowded, especially the sidewalks, that it seems to have nearly reached the limit of its capacity, and it seems probable that stores on the outskirts of the district may thrive at the expense of those already established in the most eligible spots, mainly because of the approaches to them being less uncomfortably crowded. If what is the most conveniently-situated locality is thus gradually abandoned to wholesale trade and other uses, it would be a real misfortune to the community at large. It would be so not only because of the convenience of the present situation of the main centre of retail trade, but also because it would, in any other place, lose somewhat of its concentrated character. Some of the advantages of concentration of trade are obvious to any one who is familiar with the great dry-goods stores, which not only give the customers the benefit of the reduced percentage of expenses incident to a large business under one organization, but offer a larger selection, newer goods, and lower prices, due to the power of making larger purchases from manufacturers and other causes. Much time and strength is also saved to customers through being able to buy many different things in a single large store. But there are many other advantages in concentration, even when not under one organization. By concentration the greatest

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economy in the supplying of small amounts of power is rendered possible; likewise of heat, of electric-light, of telephones, of pneumatic-tubes for despatching parcels from place to place in the city and to distributing-stations in the suburbs, of fine fireproof buildings and the best appliances for preventing or extinguishing fires, of efficient policing, and so on. But perhaps the greatest economy of all is in time. To the community at large, as well as to individuals, whatever arrangements tend to save time are of the utmost importance.

If it be true that the expense of widening some of the most important streets in the liberal way that has been done in Paris, and which has made that city famous as the handsomest, pleasantest and most convenient for shopping of any in the world is prohibitive, there yet remains a method of meeting the difficulty of overcrowded streets in a far less costly way than even the usual moderate widening. That is to add the existing sidewalks to the roadway and to build new and much wider sidewalks through the fronts of the buildings in the form of "arcades." Such arcades exist in the old town of Chester in England, much more systematically and extensively in Turin, and more or less in many other European cities. Such a scheme could be carried out at very moderate expense for construction and the damage to buildings would be slight; in fact, by raising such as had too low a ceiling in the first story, not a single building would have to be torn down. The cellars under the arcade and the floors above it would not necessarily have their usefulness at all interfered with. The damage to property would, practically, consist merely in the taking of so much rentable floor-space. The lessening of the light in the stores on the ground-floor would be amply compensated for by keeping the arcade brilliantly lighted by electric lights day and night at the public expense. No attempt at external architectural unity of design would be necessary, as the finish of the arcade could be made to accord with the style of the buildings through which it passed. The noise of the trampling of many feet could probably be lessened by using a wooden-block pavement, with grain on end: as it would be under shelter, the principal objection to the use of this kind of pavement in streets would not hold. The arcade could be made thoroughly fireproof and automatic-sprinklers and automatic fireproof curtains could be arranged to prevent a fire from spreading along the arcade. The public, in walking through the arcade, would be protected from snow, rain and sun. Many stores, reaching through from street to street, would form covered ways across blocks in addition to the arcade on the cross-streets. The new shop-fronts could be entirely of glass, as no heavy piers would have to be provided at the place where they would come to give the sense of support as well as the reality, an advantage which architects should be quick to appreciate.

There would be a secondary advantage in the arcade scheme hardly less important than that of affording more room to ordinary street traffic; namely, that of economically providing an easily-accessible subway (by taking the portions of the private cellars that would be under the arcade and partitioning them off) in which to place pneumatic-tubes, steam, water and gas pipes, and telephone, telegraph and electric-light wires. It may even not be thought to be a wild suggestion that some day the space under such arcades might come to be used for some form of rapid transit.

The advantages of public arcades in crowded shopping-districts are so obvious to any one who has seen them abroad that it is a matter of wonder that they have not come into use in this country, and especially in Boston, where the streets are so narrow and crowded.

J. C. Olmsted.

ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

HOUSE OF E. V. R. THAYER, ESQ., LANCASTER, MASS. MESSRS. ANDREWS & JAQUES, ARCHITECTS, BOSTON, MASS.

[Gelatine print, issued only with the Imperial Edition.]

The *American Architect* for August 4th contained a view of this house taken from another point.

COMPETITIVE DESIGN FOR THE NEW MUNICIPAL BUILDINGS, NEW YORK, N. Y. MR. CYRUS K. DEAN, ARCHITECT, ERIE, PA.

DESIGNS MADE BY THE STUDENTS OF THE ARCHITECTURAL DEPARTMENT OF THE UNIVERSITY OF ILLINOIS.

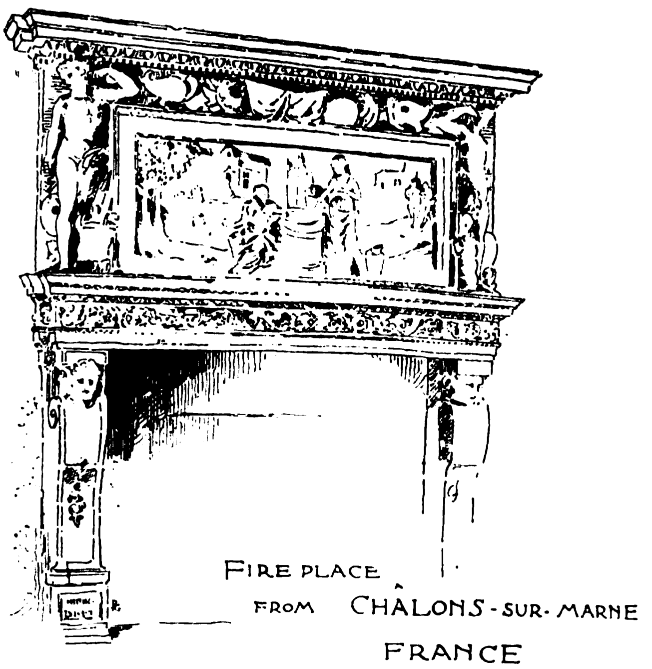
See article elsewhere in this issue.

COMPETITIVE DESIGN FOR A CHURCH AT WAKEFIELD, MASS. MESSRS. WAITT & CUTTER, ARCHITECTS, BOSTON, MASS.

DESIGN FOR WEST END SCHOOLHOUSE, BRIDGEPORT, CONN. MESSRS. LONGSTAFF & HURD, ARCHITECTS, BRIDGEPORT, CONN.

UNITED STATES GOVERNMENT BUILDING PRACTICE.[1]—XII.

ROOF COVERING.



Under this heading is generally included everything to complete the roof after the framing and boarding or roof tiles are put on; embracing slating, copper-work of decks, valleys, flashings, tinwork, roof-trimmings, hips, ridges and down-pipes.

On the better class of Government buildings the steep portions of roofs and the roofs and sides of dormers are covered with slate, and the flat or deck roofs with copper; on cheaper buildings tin is used on deck roofs.

Slating. The best known slates are from the Bangor quarries in Maine, Peach Bottom, Pa., and Buckingham, Va., but fine slate is also found in other places, and is generally of a blue-black or dark-purple color and sometimes red.

The steep or mansard portions of roofs, tower-roofs and roofs and sides of dormers are covered with slate.

All roofs whether covered with slate, tin, or copper should be covered with heavy fibre building-paper, or sometimes in best work a coating of one-half Portland cement and one-half coarse, clean sharp sand about 1″ thick is used over terra-cotta roofing tiles.

The slates for large important buildings are generally made 10″ x 20″ x $\frac{3}{16}$″ to $\frac{1}{4}$″ thick, with sawn edges and tails laid with 3″ lap showing 8½″ to the weather: for smaller buildings they are usually made 8″ x 16″ x $\frac{3}{16}$″ average thickness with cut edges and tails 3″ lap and showing 6½″ to the weather. All slates should be secured at waists by two broad headed galvanized wrought-iron nails 1½″ long if on boarding, and by two $\frac{3}{16}$″ bolts on terra-cotta tiles passing through with nut and washer on underside of tile.

The slate on a great many large buildings have been secured directly to the L or ⊥ bar purlins by heavy copper wire passing through holes in slates and tied around bars; also by Farquhar's patent slate-fasteners (see Figure 43): but since terra-cotta roof-tiles have been used this is discontinued, and bolts passing through slates and tiles are used. The holes in slates for bolts or nails should be countersunk for the heads, in good work.

The slates for circular and conical surfaces should be cut to radiate from the centre or apex, the courses decreasing in width towards the top, and each course should be of a uniform width and properly break joint.

All the slates should have smooth split surfaces, out of wind, with edges and tails cut or sawn straight or square. The lines of slates at valleys, hips, ridges and eaves should be cut straight and the slates

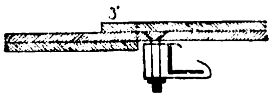


Fig. 43.

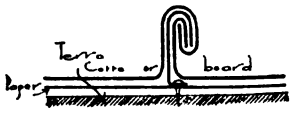


Fig. 44.

have a double course at eaves and ridges, and fit closely to hips. Fitting-pieces should be provided at eaves and against chimneys, etc., to properly throw off the water.

Where slates come against masonry, copper or tin flashings should be worked in between each slate and cap-flashed.

Terra-cotta roof-covering tiles should be secured by bolts or nails

[1] Continued from No. 649, page 262.

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in same manner as slates, and where the tiles are plain flat, they should have a proper lap and be laid similarly to slates in every way. These tiles have the advantage over slate, in that if the slates are heated by fire and water is thrown on them, they are apt to split and crack, but the tiles will not.

Copper and Tin Work. Copper and tin are used for deck or flat roofs, gutters, valleys and flashings, and are secured in place in the same way. Copper is used for the better class of work, being much more expensive than tin, and in any event is generally used for gutters, valleys and flashings.

Sheet-lead and zinc have been seldom used and then they have not proved satisfactory.

Copper for flat or deck roofs is generally made 12 ounces to 14 ounces per square foot, and for gutters, valleys and flashings 14 ounces to 18 ounces per square foot, being required heavier for northern than for southern climates.

Tin for deck roofs is generally made IXX charcoal tin, sometimes IX, in sheets 14″ x 20″, and for gutters, valleys and flashings IXX in sheets to suit the widths required.

The joints for both copper and tin are generally made standing for those running up the incline of the roof secured by either copper or tin tags nailed to boards or terra-cotta plates, or embedded in cement spaced every 12″, and the upper ends worked into the seams as per Figure 44, and in best work the joints riveted ever 2½″ apart: the horizontal joints to be flat double-locked, well-soldered and perfectly watertight.

The joints in gutters and valleys should also be double-locked and soldered. The standing joint is better than the flat for running up the incline, as it allows more expansion and contraction, but flat joints of course are necessary for the horizontal ones. Great care should be taken to allow for expansion and contraction where there is much variation in the temperature of the climate.

The copper should always be tinned on upper side, where the drain-water from roof is to be carried into a cistern for use, and as tinning costs only about 3 cents to 5 cents per square foot, this should always be done, as at some future time the roof-water might be used.

Flashings. Against all masonry etc., flashings should be worked in between slates, or tiles turned up against masonry at least 4″, and have a cap or apron flashing let into joint of brick-work or into chase cut in the stonework, caulked with lead on the underside, and turned down over the under-flashing, the edge being at least 1″ above slates. Projecting courses of stone or brick are frequently cap-flashed with copper, tin or galvanized iron: the metal to be let into joint above course, extend over and turned up under nosing or crown-mold, or sometimes secured to galvanized-iron strip as hereafter described for gutter.

The valley flashing should be one piece of metal its entire width, and should extend from 10″ to 16″ each side of angle, and have slates overlap it 4″, with the horizontal joints double-locked and soldered, and the flashing nailed on each side to boarding or porous roof-tiles every 12 inches.

Gutters. Gutters are generally formed on top of stone or brick walls, by angle-irons set up for the front, secured to masonry by expansion-bolts, or to wood strips built in the brickwork and nailed

Fig. 45.

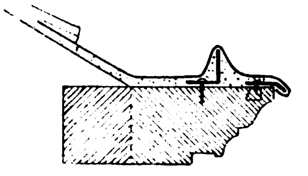
Fig. 46,

to look-outs, the lining should be in one piece the entire width of gutter, and in as long lengths as practicable; it should extend up the roof under the slates or roof-covering higher than the front edge so that in case down-pipes become stopped up, the water would overflow and not get inside the building. The front edge of gutter is generally secured to stonework by having a galvanized sheet-iron strip No. 16 B. W. G., 3″ or 4″ wide continuing the whole length of gutter secured to stone every 12″ by ¼″ diameter expansion bolts or screws leaded in, but these should be placed far enough from the edge not to chip it off by expansion (see Figure 46). The gutters should have a grade, towards outlets formed in wood or cement, not less than ½″ in 10′ 0″.

Gutters formed in stone should be lined, or have joints between stones protected by metal, caulked on each side with lead into stone, and jointed and soldered as per Figure 47.

Wherever nails are required for nailing gutters, valley flashings etc. to woodwork, they should be copper, galvanized-iron or tinned nails, their heads cap-flashed and all soldered perfectly watertight. All joints should be soldered, and riveted where possible.

Outlets.— Bell-shaped 16-ounce copper outlets should be formed in gutters twice the area of down-pipes, securely joined and soldered to gutters, and to 16-ounce copper goosenecks which are to be properly connected with the iron down-pipes on the inside of the wall; the outlets to be covered with copper, or galvanized-iron wire hemispherical gratings to prevent débris getting into the pipes. The down-pipes from gutters if carried down on inside of wall in chases, should be cast-iron hub-pipe 4″ diameter thoroughly tarred inside and out, the joints to be made with oakum run with molten lead and caulked watertight; or in more expensive and better work wrought-iron screw-joint pipes 3″ diameter tarred inside and out, with screw-joint connections. The iron pipes should have elbow at bottom and rest on brick piers and secured every 4′ 0″ to brickwork in chase by pipe-hooks and connected either to horizontal drain and soil-pipes in basement; or carried through wall below first floor, with ornamental mouthpiece to discharge on drip-stone for surface drainage.

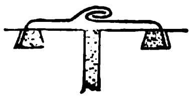
Fig. 47.

The pipes if brought down on outside of wall should be copper or galvanized-iron 3″ to 4″ diameter or squared 3″ by 4″ secured to wall every 4′ 0″ and have mouthpiece for discharging on drip-stone, or entering cast-iron pipes 5′ 0″ above grade for connection to drain or soil pipes.

Roof Trimmings.— The roof trimmings, that is, gutter fronts, crown moulds of cornice, hips, ridges, deck-cornices, dormer-cornices etc., are most always made of galvanized-iron or copper on wood roofs, and frequently on iron roofs. Copper for these trimmings is more durable provided it is well braced and has strong framing for support, but is not so stiff and is more expensive than galvanized-iron. The weight of copper used varies from 16 ounces per square foot for light trimmings to 24 ounces, for heavy moulded and ornamental trimmings; galvanized-iron varies from No. 26 B. W. G., about $\frac{1}{56}$ of an inch thick, for hips, ridges and small cornices to No. 16 B. W. G., about $\frac{1}{16}$ of an inch thick, for heavy crestings, cornices, finials, dormer fronts, etc. The sheets of copper or galvanized-iron should have the uneven edges trimmed off and should be perfectly uniform in thickness, and heavily rolled to remove any inequalities, cavities or blisters from the surface.

All trimmings should be thoroughly braced and supported by and riveted to cast-iron brackets (if on an iron roof) every 3′ 0″ apart riveted or bolted to the iron work; or (if on a wood roof) should be supported on wood blocking or cores on the interior closely following the moulded contours of the galvanized-iron or copper, which is to be strongly nailed to the wood. All joints and connections should be properly lapped not less than 3″, riveted wherever practicable and thoroughly soldered. Galvanized iron or copper nails should be used for securing to framing or woodwork, the heads to be capped and soldered all perfectly watertight.

Painting.— All the exposed galvanized-iron, tin and metal work should be painted one good coat of metallic paint, or red lead and linseed oil; the portions which are ornamental to have two additional coats of approved tints. The copper work when untinned should not be painted, especially where the natural color of the copper is intended to have an architectural effect.

MEASUREMENT.

Slating and roof-covering tiles are generally estimated by the square = one hundred square feet of roof laid, the actual net roof-surface should be obtained allowing only sufficient amount for wastage, caused by cutting at valleys and against hips for fitting; no allowance is made for the double courses at eaves and ridges.

Copper and tin for roofs is also measured and estimated by the square, taking extreme measures for surface and allowing for wastage at valleys and hips.

Copper and tin flashings and gutters are generally estimated by the lineal foot, giving extreme measures at all external and internal angles, giving the girth and method of securing.

Copper and galvanized-iron hips, ridges, crestings, cornices, etc. are generally estimated by the lineal foot, giving girth, contour, designs and manner of securing in place.

Dormer fronts in copper or galvanized-iron are generally estimated by the square foot, taking net surface as near as practical and allowing for wastage in cutting, in the price.

Finials are estimated by the piece giving design and dimensions.

COST.

Roofing-paper which should form a base for all roof-covering is generally 2 or 3 ply felt, well tacked down with 1″ diameter tin washers and coated with asphalt: it costs from $2.00 to $2.50 per square for 2-ply felt, and $2.75 to $3.00 for 3-ply felt.

Slating costs from $9.00 per square for small slates with cut edges nailed to boards, up to $18.00 and $20.00 per square for best quality large slate with sawn edges and secured on terra-cotta roof-tiles. The slates for the custom-houses at Albany, N. Y., Cincinati, O., Harrisburg, Pa., Philadelphia, Pa., and Memphis, Tenn., and for the Barge Office in New York City, were 10″ x 20″ x ¼″ to ⅜″ thick sawn edges and secured by Farquhar's patent galvanized-iron fasteners, and cost from $27.00 to $30.50 per square.

Terra-cotta roof-covering tiles are made up from ¼″ to ⅜″ thick; the plain flat ones secured like slates cost from $12.00 to $15.00 per square, and the ornamental ones cost a little more, dependent on sizes, lugs, shoulders, etc., which are made on the tiles and the designs,

Tin roofing costs from about $5.50 per square for IX charcoal tin, to $6.50 and $7.00 for IXX tin.

For flashings and gutters about ¼ to ½ additional cost should be allowed for the labor and securing same in place.

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The cost of copper-roofs depends almost entirely on the price of copper; the labor of working it is less than either tin or galvanized-iron. Copper was very expensive until 1885 and 1886, when the cost fell to 15 cents and 17 cents per pound, when the cost of roofing was from $18.00 to $22.00 per square, dependent on the weight per square foot, and the sizes of the sheets: it has advanced again in price to 28 cents and 31 cents per pound, and roofing now costs from $33.00 to $36.00 per square.

Plain galvanized-iron for trimmings costs from 16 cents to 22 cents per square foot, the trimmings put in place complete, cost from 30 cents to 50 cents per square foot, dependent on mouldings and ornamentation. Jas. E. Blackwell.

CIRCULAR

OF THE COMMITTEE OF CONFERENCE OF THE AMERICAN INSTITUTE OF ARCHITECTS, THE WESTERN ASSOCIATION OF ARCHITECTS, AND THE NATIONAL ASSOCIATION OF BUILDERS ON A STANDARD FORM OF CONTRACT.

Dear Sir, — The Committee of Conference on a Standard Form of Contract, appointed at their last Annual Conventions by the several Associations above named, beg leave to present the accompanying specimen copy of such Contract as the result of their united labors in that behalf, and respectfully ask its adoption by you in your practice.

The object sought to be obtained by the Committee was to prepare a Form of Contract which could be received and adopted generally by architects and builders as a Standard Form, and in which the several provisions necessary to constitute an equitable agreement, as between the owner and the builder, would be incorporated. The Joint Committee were empowered by their respective Associations to prepare and adopt such a Form of Contract, and this work, as embodied in the accompanying printed copy, may be said to be the authorized Standard Form of said Associations.

The action of the Committee in this regard was as follows: After an exchange of views through correspondence, an arrangement was made to have the Committee meet in the City of New York. Accordingly such a meeting took place on the sixth of June ult., and an organization was effected by electing a Chairman and Secretary. This meeting was adjourned from day to day — daily sessions and one evening session being successively held — until the labors of the Committee were essentially completed. The matter was then referred to a sub-Committee, consisting of the Chairman and Secretary of the Joint Committee, to revise the manuscript for publication. It was afterwards submitted individually to the several members of the Committee, subjected again to another revision, and finally adopted as printed.

In order to preserve the Form from errors, alterations or interpolations, it has been copyrighted. It is the general intention of the members of the National Association of Builders' to have it understood that in all cases where proposals for any work are submitted by them, such proposals are made with the understanding that the contract made upon this Standard Form is the one that is to be executed by them upon such proposals.

The Inland Publishing Company, 19 Tribune Building, Chicago, Ill., has been licensed to publish the blanks, and any number of copies, with prices, etc., can be obtained from them on application. The blanks will be furnished at $1.10 per 100, $4.25 per 500, and $8 per 1,000, free by mail or express. Architects can have their names and the consequent pronouns inserted, as they may order, at small additional cost.

The members of the Committee of Conference, appointed by their several Associations, are as follows:

Of the American Institute of Architects.	O. P. Hatfield, New York, N. Y. Alfred Stone, Providence, R. I. J. H. Windrim, Philadelphia, Pa.
Of the Western Association of Architects.	S. A. Treat, Chicago, Ill. W. W. Clay, Chicago, Ill. J. F. Alexander, Lafayette, Ind.
Of the National Association of Builders.	John S. Stevens, Philadelphia, Pa. George C. Prussing, Chicago, Ill. John J. Tucker, New York, N. Y.

O. P. Hatfield, *Chairman*.

Wm. H. Sayward, *Secretary*,
164 Devonshire St., Boston.

New York, August 8, 1888.

FORM OF CONTRACT ADOPTED BY THE JOINT COMMITTEE OF THE AMERICAN INSTITUTE OF ARCHITECTS, THE WESTERN ASSOCIATION OF ARCHITECTS AND THE NATIONAL ASSOCIATION OF BUILDERS.

——*Architect* .

This Agreement, made the——day of——in the year one thousand —hundred and——by and between——part of the first part, (hereinafter designated the *Contractor* ;), and——part of the second part (hereinafter designated the *Owner* ;)

Witnesseth that the Contractor , being the said part of the first part, in consideration of the covenants and agreements herein contained on the part of the Owner , being the said part of the second part, do covenant, promise and agree with the said Owner , in manner following, that is to say:

1st. The Contractor shall and will well and sufficiently perform and finish, under the direction, and to the satisfaction of——Architect (acting as Agent of said Owner), all the work included in the—— agreeably to the drawings and specifications made by the said Architect , and signed by the parties hereto, (copies of which have been delivered to the Contractor), and to the dimensions and explanations thereon, therein and herein contained, according to the true intent and meaning of said drawings and specifications, and of these presents, including all labor and materials incident thereto, and shall provide all scaffolding, implements and cartage necessary for the due performance of the said work.

2d. Should it appear that the work hereby intended to be done, or any of the matters relative thereto, are not sufficiently detailed or explained on the said drawings, or in the said specifications, the Contractor shall apply to the Architect for such further drawings or explanations as may be necessary, and shall conform to the same as part of this contract, so far as they may be consistent with the original drawings, and in event of any doubt or question arising respecting the true meaning of the drawings or specifications, reference shall be made to the Architect , whose decision thereon, being just and impartial, shall be final and conclusive. It is mutually understood and agreed that all drawings, plans and specifications are and remain the property of the Architect .

3d. Should any alterations be required in the work shown or described by the drawings or specifications, a fair and reasonable valuation of the work added or omitted, shall be made by the Architect , and the sum herein agreed to be paid for the work according to the original specification, shall be increased or diminished as the case may be. In case such valuation is not agreed to, the Contractor shall proceed with the alteration, upon the written order of the Architect , and the valuation of the work added or omitted shall be referred to (3) three Arbitrators (no one of whom shall have been personally connected with the work to which these presents refer), to be appointed as follows: one by each of the parties to this contract, and the third by the two thus chosen; the decision of any two of whom shall be final and binding, and each of the parties hereto shall pay one-half of the expenses of such reference.

4th. The Contractor shall within twenty-four hours after receiving written notice from the Architect , to that effect, proceed to remove from the grounds or building, all materials condemned by , whether worked or unworked, or take down all portions of the work which the Architect shall condemn as unsound or improper, or as in any way failing to conform to the drawings and specifications, and to the conditions of this contract. The Contractor shall cover, protect and exercise due diligence to secure the work from injury, and all damage happening to the same by neglect, shall be made good by

5th. The Contractor shall permit the Architect , and all persons appointed by the Architect , to visit and inspect the said work or any part thereof, at all times and places during the progress of the same, and shall provide sufficient, safe and proper facilities for such inspection.

6th. The Contractor shall and will proceed with the said work, and every part and detail thereof, in a prompt and diligent manner, and shall and will wholly finish the said work according to the said drawings and specifications, and this contract, on or before the——day of—— in the year one thousand——hundred and——(provided that possession of the premises be given the Contractor , and lines and levels of the building furnished him, on or before the——day of——in the year one thousand——hundred and——), and in default thereof the Contractor shall pay to the Owner——dollars for every day thereafter that the said work shall remain unfinished, as and for liquidated damages.

7th. Should the Contractor be obstructed or delayed in the prosecution or completion of the work by the neglect, delay or default of any other contractor; or by any alteration which may be required in the said work; or by any damage which may happen thereto by fire, or by the unusual action of the elements, or otherwise; or by the abandonment of the work by the employees through no default of the Contractor , then there shall be an allowance of additional time beyond the date set for the completion of the said work: but no such allowance shall be made unless a claim is presented in writing at the time of such obstruction or delay. The Architect shall award and certify the amount of additional time to be allowed; in which case the Contractor shall be released from the payment of the stipulated damages for the additional time so certified and no more. The Contractor may appeal from such award to arbitrators constituted as provided in Article 3d of this contract.

8th. The Contractor shall not let, assign or transfer this contract, or any interest therein, without the written consent of the Architect .

9th. The Contractor shall make no claim for additional work unless the same shall be done in pursuance of an order from the Architect , and notice of all claims shall be made to the Architect in writing within ten days of the beginning of such work.

10th. The Owner agree to provide all labor and materials not included in this contract in such manner as not to delay the material progress of the work, and, in the event of failure so to do thereby causing loss to the Contractor , agree that will reimburse the Contractor for such loss; and the Contractor agree that if shall delay the material progress of the work so as to cause any damage for which the Owner shall become liable (as above stated), then shall make good to the Owner any such damage — over and above any damage for general delay herein otherwise provided; the amount of such loss or damage, in either case, to be fixed and determined by the Architect , or by arbitration, as provided in Article 3d.

11th. The Owner shall effect insurance on said——work, in his own name and in the name of the Contractor , against loss or damage by fire, in such sums as may from time to time be agreed upon with the Contractor , the policies being made to cover work incorporated in the building, and materials for the same in or about the premises, and made payable to the parties hereto, as their interest may appear.

12th. Should the Contractor at any time refuse or neglect to supply

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a sufficiency of properly skilled workmen, or of materials of the proper quality, or fail in any respect to prosecute the work with promptness and diligence, or fail in the performance of any of the agreements on part herein contained, such refusal, neglect or failure being certified by the Architect , the Owner shall be at liberty, after three days written notice to the Contractor , to provide any such labor or materials, and to deduct the cost thereof from any money then due or thereafter to become due to the Contractor under this contract; and if the Architect shall certify that such refusal, neglect or failure is sufficient ground for such action, the Owner shall also be at liberty to terminate the employment of the Contractor for the said work and to enter upon the premises and take possession of all materials thereon, and to employ any other person or persons to finish the work, and to provide the materials therefor; and in case of such discontinuance of the employment of the Contractor he shall not be entitled to receive any further payment under this contract until the said work shall be wholly finished, at which time, if the unpaid balance of the amount to be paid under this contract shall exceed the expense incurred by the Owner in finishing the work, such excess shall be paid by the Owner to the Contractor , but if such expense shall exceed such unpaid balance, the Contractor shall pay the difference to the Owner . The expense incurred by the Owner as herein provided, either for furnishing materials or for finishing the work and any damage incurred through such default, shall be audited and certified by the Architect , whose certificate thereof shall be conclusive upon the parties.

13th. And it is hereby mutually agreed between the parties hereto, that the sum be paid by the Owner to the Contractor for said work and materials shall be——subject to additions or deductions on account of alterations as herein before provided, and that such sum shall be paid in current funds by the Owner to the Contractor in instalments as follows:

It being understood that the final payment shall be made within ——days after this contract is completely finished, provided, that in each of the said cases the Architect shall certify in writing that all the work upon the performance of which the payment is to become due has been done to satisfaction; and provided further, that before each payment, if required, the Contractor shall give the Architect good and sufficient evidence that the premises are free from all liens and claims chargeable to the said Contractor ; and further, that if at any time there shall be any lien or claim for which, if established, the Owner or the said premises might be made liable, and which would be chargeable to the said Contractor , the Owner shall have the right to retain out of any payment then due or thereafter to become due, an amount sufficient to completely indemnify against such lien or claim, until the same shall be effectually satisfied, discharged or cancelled. And should there prove to be any such claim after all payments are made, the Contractor shall refund to the Owner all moneys that the latter may be compelled to pay in discharging any lien on said premises, made obligatory in consequence of the former's default.

14th. It is further mutually agreed between the parties hereto, that no certificate given or payment made under this contract, except the final certificate or final payment, shall be conclusive evidence of the performance of this contract either wholly or in part, against any claim of the Owner , and no payment shall be construed to be an acceptance of any defective work.

15th. And the said Owner hereby agree with the said Contractor to employ, and hereby employ to provide the materials and to do the said work according to the terms and conditions herein contained and referred to, for the price aforesaid, and hereby contract to pay the same, at the time, in the manner, and upon the conditions above set forth.

16th. And the said parties for themselves, their heirs, executors, administrators and assigns, do hereby agree to the full performance of the covenants herein contained.

In Witness Whereof, the parties to these presents have hereunto set their hands and seals, the day and year first above written.

In presence of

MR. RUSKIN'S MUSEUM AT SHEFFIELD.—Half-a-dozen years have passed since Mr. Ruskin offered to Sheffield all his art treasures, providing the town would find a suitable building for their preservation. He even went further in his spirit of munificent liberality by undertaking to personally superintend the arrangement of the objects in the museum, and be responsible for its management during his lifetime. It was proposed that the new building should be built at Endcliffe, one of the most beautiful spots within the boundaries of the old town. Money was not wanting; £10,000 were subscribed; plans were prepared and the design was admitted by Sheffield experts to excel anything they had thought possible. Then an irritating obstacle occurred. Matter-of fact municipal magnates intervened. They did not understand the nature and purposes of the St George's Guild, and distrusting its continuance, made it a condition of subscription that the museum should be satisfactorily guaranteed to Sheffield forever. Technical difficulties arose as to the title and the nature of the guaranty that the museum should remain the inviolable and permanent possession of the town. Mr. Ruskin has a scornful contempt for superficialities, and he cannot bring his mind down to legal hair-splitting. He declined to read any further lawyer's quibbles, and his indisposition left the matter in abeyance. It is satisfactory, however, to know that the settlement of the whole question will no longer be delayed, and that soon the new building will rise in all its fair proportions Mr. Ruskin has deputed the trustees to cut the Gordian knot by telling the lawyers to draw up a conveyance between the mayor and corporation of Sheffield and the St. George's Guild, The pictures and objects, as well as the building, are to remain the property of the public forever. The new museum will be a splendid memorial to its founder, and a permanent embodiment of his ideas. May he long be spared to advise in all its counsels and to direct its resources.—*Magazine of Art.*

THE EXCAVATIONS AT SYBARIS.

WHILE the discoveries at Sybaris have not been, as it was at first believed, those of the Greek city destroyed five centuries B. C., they have disclosed an interesting prehistoric fact—namely: that prior to the existence of the Greek Sybaris there was on the site which the Greek colonists, after the fashion of those days, appropriated and built a new city on, an Italic city, the necropolis of which, in an apparently undisturbed state, has been found, and which contains remains due to an archaic civilization so precisely corresponding to those found in other parts of the peninsula—at Vetulonia, at Civita Castellana, Corneto, and various more northern points—as to add to the evidence of a general Italic civilization prior to the Etruscan, and extending over the entire peninsula.

I had the pleasure not long since of visiting the excavations now going on at Corneto with Professor Helbig, who is the official director in that district, and saw, with the advantage of his elucidation, the results of the late important explorations. The discovery, on the site of the well-known and long-explored Etruscan necropolis, of the earlier form of tomb, the so-called *pozzi* or well-tombs with the strange mingling of Oriental and native arts, the hut-urns, with arms of scarcely questionable Eastern origin, seriously impugned previous archæological conclusions. The hut-urns containing incinerated human remains, and originally found on the Alban Mount under two strata of volcanic ashes, were regarded as the earliest evidence of human residence in Italy, and as belonging to the Latin as distinguished from the Etruscan inhabitants. They belong to the well-tombs mainly, and have since their discovery in the centre of Latium been found in places so widely sundered that they must, at all events be accepted as not merely Latin but Italic, whether this word implies more or less than Etruscan. The admirably systematic manner of making the excavations now followed, so different from the old system, gives each article found its proper value, and the absolute connection is thus made clear between the hut-urns and the objects of bronze found with them. Among the latter are helmets of the most skilful fabric and swords of both bronze and iron, while the former are the rudest forms of pottery, hand-made and only half-baked, and what is most singular, in some tombs are copies of the helmets in clay, made as covers to the round urns, a use to which the original bronze helmets seem to have been put after the death of the owner. In the same necropolis with these are found the "corridor" tombs, and the latest and best-known form of the Etruscan tomb, the "chamber," the paintings on some of which at Corneto are celebrated, and form a series coming down to Roman times.

The apparent solution of the puzzle is that here were three stages of civilization following each other on one site. Helbig, on the contrary, is of the opinion that the three are only phases of one civilization, and that Etruscan; and that to a certain extent they overlapped in the manner of disposing of the dead, but that there was in no case a break, such as would be caused by the intrusion of a strange race introducing new arts. The bronze arms and implements he considers Phœnician and of Carthaginian origin, and, as he would not admit a greater antiquity to them than about 900 B. C., they would nearly coincide in date with the generally assigned date of the entry of the Etruscans into Italy. But their identity with the articles found at Sybaris, where the Etruscans did not reach, and the evidences of a much greater antiquity in certain implements found in the remains of the lake dwellings, which are almost or quite identical with those found at Sybaris, though found in the extreme north of Italy, make this solution very difficult to accept; and though one does not like to hold out against the immense erudition of Helbig, still the facts are there, and even when we owe them to him we have the right to draw our own conclusions. At a recent meeting of the Institute there were shown bronzes from a lake deposit which the excavator assured me were, by the evidence of the geological record, not later than 1500 B. C., and were of most exquisite casting, and of form similar to those found at Sybaris. And against the opinion of Helbig we have that of all the Italian archæologists, who regard the evidence as conclusive in favor of an Italic civilization prior to the Etruscan.—*London Times Rome Correspondence.*

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BOOKS — PAPERS

RECORDS of tests of building materials are always interesting to architects, especially such experiments as have to do with masonry and masonry materials. When a series of tests is conducted and the results compiled by so eminent an authority as the late General Gillmore, the results are such as cannot fail to be of value. In some respects the title of General Gillmore's recent work[1] is a misnomer in that it would seem to indicate a larger series of experiments with actual masonry constructions than is actually recorded. The experiments having to do with piers form of themselves a very small portion of the volume, and the bulk of the work is taken up with experiments made on small cubes of various materials.

The tests were made at the Watertown Arsenal, near Boston, with the aid of the 800,000 pound testing-machine. In the introduction there is a quite extended reference to a series of tests made at Staten Island in 1875 by General Gilmore. The results in this case present some curious facts in regard to the nature of the bearing surfaces brought against the material to be tested. Thus it was found in testing such stones as granite, East Chester marble and blue Berea sandstone, that the ultimate resistance of the samples crushed between either steel bearings, wooden blocks, lead sheets or leather pads was in the ratio of: Steel, 100; wood, 94; lead, 65, and leather, 60. With a series of stones which were less compact than the first, the proportions were: Steel, 100; wood, 82; lead, 65, and leather, $63\frac{6}{10}$. General Gillmore explains the reason for these differences by assuming that the softer materials such as wood, lead, etc., under great pressures tend to force their way into the pores of the stone, and to act like wedges to split it apart, whereas the steel is more nearly homogeneous and exerts nothing but a direct pressure on the sample. The deduction which might reasonably be made from this fact is in direct opposition to an old idea of inserting lead-bearing plates between the bedstone and bottom plates of iron columns. If General Gillmore's assumptions are correct, lead plates so used would tend to weaken rather than increase the effective resistance of the pier.

In testing the samples, General Gillmore devised a very efficient way for bringing out the full resistance of the material. The bed-plates of the testing-machine are as nearly absolutely parallel and plane as human mechanism can make them, but it is almost impossible to make any sample of stone absolutely parallel and plane between their faces, and if there be any inequality in the surfaces the subsequent pressure of the machine would be apt to split it rather than crush it. The device adopted was to place the sample in position between the bearing plates of the machine and bring upon it only sufficient pressure to hold it from slipping, the testing machine acting horizontally. Thin plaster-of-Paris paste was then poured in at the joints until every cavity between the beds of the sample and the iron plates was thought to be filled. The plaster was allowed to harden for twenty-four or thirty-six hours, and the pressure then applied.

In some previous experiments General Gillmore had ascertained that the results of tests indicated not only that the slabs of stones increased in resistance per square inch as their surfaces increased, but also that the strength per square inch of cross-section of cubes increased with their size, although in a lesser ratio; that is to say, if the 2″ cube will break under an average load of 50,000 pounds per square inch, samples of twice the area of cross-section would stand considerably more than twice the load. General Gillmore worked out a formula to express this:

$$y = a\sqrt[3]{x}$$

in which a is the pressure in pounds required to crush a one inch cube; x the side of any cube expressed in inches, y the pressure in pounds per square inch of bed-surface needed to crush it. In other words, with cubes of the same material the crushing resistance per square inch of pressed surface increases approximately in the ratio of the cube roots of the respective cubes.

Subsequent experiments have not shown this rule to be absolutely correct. It is a theoretical equation, and one which could hardly be applied to large blocks or piers unless the material were as homogeneous in large masses as in the small unit block. A comparatively large cube ceases to be a unit, and is rather a conglomerate of smaller irregular pieces joined together by cementing substances of varying strength, and perhaps slightly separated by minute cracks, cavities or pores. Under such conditions the stone cannot develop the same strength as if it were a true unit. It is known, and has been proved by tests made at the Watertown Arsenal, that a cube built up in several courses is inferior to a solid cube in strength.

Another interesting fact brought out by the Watertown experiments is that the compressive strength of prisms increases as their height diminishes. The same is true of the tensile strength of iron, steel or other metals. The breaking strain is materially affected by the shape of the specimen. General Gillmore has undertaken to work out a formula to express the variation in the strength in the different sizes of cubes. The formula[2] he gives is:

$$W = C + 2\,m \times (h - h_1)^2 \times \sqrt{p}$$

in which:

W = crushing load of prism in pounds.

C = crushing load of a cube having the same area of bed as the prism.

m = crushing load of material per square inch; an average derived from testing a series of cubes of various sizes, and of the same material as the prism.

p = quotient obtained by dividing the area of the bed by the sum of the areas of the sides of the prism.

h = height of cube of crushing strength C in inches.

h_1 = height of prism in inches.

By actual experiments it was found that with an 8″ x 8″ prism 4″ high the crushing load averaged 547,264 pounds, whereas an 8″ x 8″ cube two inches high could not be broken by the maximum load of the testing-machine, 800,000 pounds. A 4″ x 4″ x 3″ sample crushed at 106,856 pounds, whereas a 4″ x 4″ x 1″ sample required 262,840 pounds to crush it. The deduction we would make from this, though such deduction is not made by General Gillmore, is that any such tests as he has made are absolutely of no value in determining the strength of masonry piers, for it is very seldom that the height of the pier is less than ten or twelve times its diameter, and in such cases, where the substance is perfectly homogeneous like granite or marble, General Gillmore's tests would be no criterion of the strength.

General Gillmore refers to the fact that the strength of concrete varies considerably, depending upon the conditions of setting; and he quotes some English experiments to show that twelve-inch concrete cubes rammed into moulds, resisted under compression an average of thirty per cent more than concrete cubes of the same size made in the ordinary way. It was also found that twelve-inch cubes set in water for one year stood a greater weight than those set in air during the same length of time; while six-inch cubes were stronger set in air than in water.

After making a number of tests of individual blocks of stone, one interesting series of tests was made on compound prisms formed of the bases that could not be broken singly. It was found that three twelve-inch freestone cubes, which had singly resisted the maximum load of 800,000 pounds, when compounded as a pier with dry joints yielded with a reverberating explosion under an ultimate pressure of 748,000 pounds. A 10″ x 10″ which had been previously unbroken, yielded when compounded with two 12″ x 12″ x 2″ prisms each equally refractory, under a stress of 654,000 pounds. General Gillmore does not attempt to draw any deductions from these experiments, but simply mentions them as interesting, and leaves his readers to draw their own inferences. If the stones had been thoroughly bedded in good cement, the results would have been quite different. There are some valuable experiments recorded having in view to ascertain the elastic limit of stones; and, as the result of this investigation, it is stated that the elastic limit of freestone cubes averages about sixty-five per cent of their ultimate resistance. This would, of course, be considered in determining the practical resistance of building stones. There are also some further experiments of great interest on the subject of the resilience of various stones from which General Gillmore deduces the proposition that "*when the area of impact is equal to the area of bed surface, the resilience of hard and rigid material like stone, when in the shape of prisms of the same fo m and area of cross-sections, but of varying heights, becomes greater as the height of the prisms increases.* On the other hand, the capacity to resist loads decreases with the increasing height of the specimen, but increases when the height or thickness is reduced, this increase being specially rapid when the height of the prism is less than one-half the height of a cube of the same cross-section."

It is to be regretted that the part of the volume which, to architects would have the most practical value, that is to say, tests of actual piers should be so slightly treated. The sets of piers tested were all of the same size, one and one-half brick in cross-section and six courses high, built up of common, hard, North River brick, laid in hydraulic mortar made of one part Newark Company's Rosendale cement and two parts sand. The mortar joint averaged about three-eighths of an inch thick. Each pier had a base and cap of North River bluestone of same cross-section as the pier, with the bed-faces rubbed smooth and plane. The height of the brickwork between the bluestone varied from sixteen and one-half inches. The length of the piers varied from twenty-two to twenty-three and a quarter inches, including the end of the stones. The age of the piers when broken was one year and nine months. The crushing strength varied from 250,000 to 291,000 pounds and averaged 266,587 pounds, equivalent to 185 pounds per square inch, or 133 tons (119 gross) per square foot.

While it would be impossible with any testing-machine at present constructed to experiment upon larger piers than the size which General Gillmore adopted, we cannot feel that the tests or records are in any sense final or such as can be used as criterions for piers such as are customarily met with in large buildings.

[1] "*Notes on the Compressive Resistance of Freestones, Brick Piers, Hydraulic Cements, Mortars and Concretes.*" By Q. A. Gillmore, Ph.D. New York: John Wiley & Sons.

[2] It seems to us that the formula would be more correctly stated if it were written

$$W = C + 2m\,(h - h_1)^2 \sqrt{p}$$

a slight difference which might make a great difference in the result.

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General Gillmore does not state whether the brick piers failed by reason of the brick crushing or the cement giving way; he states, however, that the brick piers were stronger than concretes made with Newark Company's Rosendale cement, and the mortars and concretes made with Norton's cement, but weaker than those made with National Portland cement.

General Gillmore's work is not of so practical value as his former volume on "*Limes, Cements and Mortars.*" It is more tentative, more pedantic in its argument and less direct; but so far as it goes it is a valuable addition to the library of an architect or an engineer. Still, it really adds very little to the literature of the profession. Such tests as he made are not very practical in their results. It is not possible to reason from a small cube to a huge wall or pier, neither has the opportunity yet arrived for making more extended tests on a scale which would give results as conclusive for masonry as the tests made by Professor Lanza, of the Institute of Technolgy, for wooden beams. In considering masonry structures too much allowance has to be made for imperfect workmanship. A one and one-half brick pier is no gauge for a five-foot wall. The book, however, is well worth reading, with caution, but we fancy the results would be misleading to young minds, and would be of not very much value to practical builders.

COMMUNICATIONS

BUILDING ON THE PACIFIC COAST.

LOS ANGELOS, CAL., August 14, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,— Some time ago a correspondent asked you the best city West likely for an architect to locate in. Your reply was San Diego reports said, "a building boom was asserting itself," but your advise was to make further inquiry.

Now I would take the liberty of saying a few words to all connected with the building-trades. I am an architectural draughtsman, and came here eight months ago, I have not been able to obtain more than two months' work since. Architects are going away these past three months for want of work. I personally know carpenters five months idle, and only could get a few days' work during the past seven months. Bricklayers and all others are in a similar way. The newspapers here make a noise about the great amount of work on hand, but they do not have the honesty to tell all, and those who are depending on their labor for their bread ought to stop away as there are far more hands here than enough to do all the work on hand, or likely to be for the ensuing five years. With reference to San Diego, I enclose a letter from parties there which speaks for that section.

In fact I have had letters from the entire coast, and they are all couched in the same language.

My opinion is, this southern part has been overrun by real estate fellows lying in wait to seize their prey. Evidently they have succeeded well in their endeavors.

Many purchasers who bought on the instalment-plan thinking to sell at a profit, are most anxious to sell now at a loss. I have had an offer lately (just to-day) to take up two lots, and the party would sacrifice 135 per cent of the money paid to evade an instalment now due.

I could give many other evidences that this is not the place to locate in just now for any in the building-trade. Your truly,

DISAPPOINTED.

THE "SAFE BUILDING" PAPERS.

LOUISVILLE, KY., August 15, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,— Be kind enough and inform through your journal or otherwise if Mr. Louis Berg's "Safe Building" is terminated with the July number of the *American Architect?* and oblige,

SUBSCRIBER.

[The *American Architect* for July 7 closed the last chapter of what is to constitute the first volume of Mr. Berg's work on "*Safe Building.*" It has been decided to publish this first volume during the coming autumn, so that the information may be in more accessible shape than it now is, scattered through the issues of this journal for two years passed.—EDS. AMERICAN ARCHITECT.]

THE BROOKLYN SOLDIERS' MONUMENT.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,— The competition for the Soldiers' and Sailors' Monument for Brooklyn, N. Y., is to all appearances a very limited one. Although the committee by means of your valuable paper invites architects and others for competition, the particulars for which may be obtained at the Mayor's office, none of my friends who are willing to send in a work received any answer to their application for particulars. Another striking feature in this so-called competition is the time given, not quite four weeks. Either do the gentlemen who form the committee know nothing about art, or they are indifferent as to a work of art. It is to be hoped that ample time be given to any artist who is willing to compete and that then the committee arrange an exhibition of all the drawings and models, in order that the art-loving public be allowed to judge of their merits.

JUSTICE.

[THE date for receiving competitive designs has just been changed to October 10, 1888.—EDS. AMERICAN ARCHITECT.]

A CORRECTION.

MONTREAL, CAN., Aug. 24, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—I notice in your issue of the 7th of July, under the heading of "Canadian Pacific Railway Station," that you say the derrick plant was designed by me. I beg to correct that statement and to inform you that this derrick plant was designed by Mr. M. P. Davis, a member of the firm of Messrs. Wm. Davis & Sons, the contractors for the masonry of this station. Yours truly,

P. ALEX. PATERSON, *Engineer.*

V-SHAPED DRAIN-PIPE.

WORCESTER, MASS., Aug. 22, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,— Can you inform me if the V-shaped drain-pipe, referred to in your issue of the 18th inst., as having been used by Norman Shaw, is to be found in our market? It seems to me it would be a very useful article in a great many instances and a valuable addition to the stock forms in general use.

Very respectfully yours, STEPHEN C. EARLE.

[WE do not think this shape can be found in the market. Mr. Shaw says, that he has had to get them made to order for him, as they could not be had in England, and they would be still less likely to be found here.—EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS

FORCE OF NATURAL GAS.— Although the wells about Findlay are under control, the tubing is anchored, and the awful force is held under by gates and levers of steel, it is impossible to escape a feeling of awe in this region at the subterranean energies which seem adequate to blow the whole country heavenward. Some of the wells were opened for us. Opening a well is unscrewing the service-pipe and letting the full force of the gas issue from the pipe at the mouth of the well. When one of these wells is thus opened the whole town is aware of it by the roaring and quaking of the air. The first one exhibited was in a field a mile and a half from the city. At the first freedom from the clamps and screws the gas rushed out in such density that it was visible. Although we stood several rods from it, the roar was so great that one could not make himself heard shouting in the ear of his neighbor. The geologist stuffed cotton in his ears and tied a shawl about his head and assisted by the chemist, stood close to the pipe to measure the flow. The chemist, who had not taken the precaution to protect himself, was quite deaf for some time after the experiment. A four-inch pipe, about sixty feet in length, was then screwed on and the gas ignited as it issued from the end on the ground. The roaring was as before. For several feet from the end of the tube there was no flame, but beyond was a sea of fire sweeping the ground and rioting high in the air — billows of red and yellow and blue flame, fierce and hot enough to consume everything within reach. It was an awful display of power. We had a like, though only momentary display at the famous Karg well, an eight-million-feet well. This could only be turned on for a few seconds at a time, for it is in connection with the general system. If the gas is turned off, the fires in houses and factories would go out, and if it were turned on again without notice the rooms would be full of gas, and an explosion follow an attempt to relight it. This danger is now being removed by the invention of an automatic valve in the pipe supplying each fire, which will close and lock when the flow of gas ceases, and admit no more gas until it is opened. The ordinary pressure for house-service is about two pounds to the square inch. The Karg well is on the bank of the creek, and the discharge-pipe through which the gas (though not in its full force) was turned for our astonishment, extends over the water. The roar was like that of Niagara; all the town shakes when the Karg is loose. When lighted, billows of flame rolled over the water, brilliant in color and fantastic in form, with a fury and rage of conflagration enough to strike the spectator with terror. I have never seen any other display of natural force so impressive as this. When this flame issues from an upright pipe, the great mass of fire rises eighty feet into the air, leaping and twisting in fiendish fury. For six weeks after this well was first opened its constant roaring shook the nerves of the town, and by night its flaming torch lit up the heavens and banished darkness. With the aid of this new agent anything seems possible.— *Charles Dudley Warner, in Harper's Magazine for July.*

THE CHEMICAL CLARIFICATION OF SEWAGE.— Dr. Pfeiffer of Wiesbaden (*Vierteljahreschrift für öffentliche Gesundheitspflege,* 1888, p. 50), has this to say on the insufficiency of the purification of sewage by means of chemical process: "For some incomprehensible reason, this entirely impracticable and, as regards its results, most unsatisfactory mode of treatment has during the last few years grown much in favor, and the author is of opinion that the time has arrived when a strenuous

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opposition should be offered to these so-called clarification processes, and when, in the interests of municipal authorities, warning should go forth against the excessive cost of the chemical systems of treatment, as compared with the good they can effect." Assuming that the main object to be accomplished is the removal from the sewage of bacteria, he says: "This may be accomplished in two ways, either by utterly destroying all their germs, or by extracting from the sewage the whole of the food substances which serve for their support."

"Before the influence of bacteria was so well-known as it now is, it was thought all-sufficient of the effluent, from the sewage after treatment with lime, magnesia, alumina, or salts of iron, was rendered clear to the eye, whereas it is no longer a matter of doubt that this clarification is only a treacherous mask, and that, as the food-stuffs of the bacteria remain in the water, it will soon again decompose and become filled with these organisms. It must then be evident that, as no chemical treatment can comply with the requirements of modern science, it is useless to compel towns to adopt costly chemical systems of clarification."

The Mexican Court-yard.—When one hears of houses built around a court they involuntarily think of something Oriental and magnificent, with cool arcades, palm trees and plashing fountains. But as a matter of fact these Mexican houses, though frequently picturesque, are anything but pleasant. The arcades are impressive and pretty enough by moonlight, but the fountain, except in rare instances, doesn't plash, it only creaks and groans, because it is not a fountain at all, but a well with black leather buckets and water unpleasantly suggestive of bacteria and consequent fevers. Then no one's romantic fancy has ever compassed the number and variety of evil smells which necessarily accumulate in a place so badly ventilated, and where all the functions of the household are carried on. Now and then a court-yard in the house of some rich person realizes your ideal and is a very charming place, but as a style of building for the poor and unwashed I should vote to abolish it with all speed.—*Ellen M. Slayden, in Boston Advertiser.*

Electric Conveniencies.—A friend of Professor Elisha Gray's says in verse:—

Time was when one must hold his ear
Close to whispering voice to hear—
Like deaf men, nigh and nigher;
But now from town to town he talks,
And puts his nose into a box
And whispers through a wire.

In olden times along the street
A glimmering lantern led our feet
When on a midnight stroll;
But now we snatch, when night comes nigh,
A piece of lightning from the sky
And stick it on a pole.

Artisans' Dwellings in France.—In connection with the strikes in France, and the general movement among the working-classes which they may portend, it is interesting to note some recent efforts to improve workingmen's dwellings. At Rouen a society has been formed with a capital of £20,000, which has erected six blocks in the centre of the town, capable of accommodating ninety-five families. At Lyons a similar society has built five blocks, accommodating sixty families. The rents are fixed at about the average rate of the several districts, but the tenants have complete sanitary arrangements and a good water-supply into the bargain. In each case a Director of the company visits every tenement once a week with a view of receiving complaints and entering into kindly relations with the tenants. The companies have succeeded so far in paying four per cent on the capital invested. A feature of the scheme at Lyons is that a portion of the capital was provided by the local savings bank, and it is hoped to induce similar banks at Marseilles and elsewhere to do likewise. But even so it will be a long time before France can vie with England in provision of sanitary dwellings for the working-classes.—*Journal des Débats.*

Solidified Petroleum Fuel.—According to the *Revue Scientifique*, the problem of reducing petroleum to a solid state, available for practical purposes, has been solved by Dr. Kauffman, who has followed up the experiments made in the United States with the admixing of soap. He heated the liquid, to which from one to three per cent of common soap had been added, half an hour, until the soap was completely dissolved, when the mixture acquired the consistency of tallow. The article thus obtained may be cut into pieces of suitable size for feeding to furnaces. Solidified petroleum, although it does not kindle readily, burns slowly and steadily and without smoke. The residual ash amounts to only two per cent. The combustion is only one-third as rapid as that of an equivalent weight of anthracite coal, while the amount of heat evolved is more intense.

It is natural to look for an improving demand in trade and manufacturing at the opening of September. This anticipation is strengthened at present by several facts, chief of which is, that buyers generally have very little to go and come on. Should there be a sudden rush of orders an enhancement of values would be the natural result. As it is the productive capacity of the country will probably save us from any such apprehension. The best informed authorities in the trade West and East are expressing the opinion at this time that there will be but little modification in values, but little increase in business, and but little expansion of producing capacity for some time to come. This opinion is a safe one to entertain in a general way. Two or three points must be kept in mind to enable us to form any sensible opinion of the probabilities for this winter or next spring. One is that if the law-making branch of the Government is placed in perfect harmony with the common-sense of the people, a great deal of confidence will be gained. Another is, that if the outflow of capital from abroad continues, as it has for years past, that an additional stimulus will be given to the multitude of new enterprises which have been waiting for a clearing up of questions and policies affecting ourselves as a nation. The trade reports of all kinds in newspapers speak of a steadying demand and of low prices, as well as of unsatisfactory railroad earnings, and of decreased bank clearings they unite in saying that the crop prospects are in the main favorable. They incline to the opinion that the manufacturing demand all over the country will increase from week to week. They said that there is a better condition in the petroleum market, an improving condition in the iron trade and good prospects for wheat exports and a quiet condition among the workmen of the country, and a prospect of harmonizing of the interests of the warring railway systems and an upward tendency in certain lines of manufactured products. These reviews are mainly correct so far as they cover surface facts. In so far as they attempt to predict what may be the condition six months hence they are not safe guides. The most patent fact in the situation to-day is that there is more capacity than there is employment, more money than can be safely used, more labor in the market than is wanted, and increasing weakness among the smaller tradesmen and manufacturers who entered into business during the past two or three years. The commercial authorities are quietly predicting a general weeding-out within the next year of these weaker traders. Jobbers and manufacturers who watch the course of trade closely think that there will be a sweeping up or out of trade channels of a great many houses and firms that have crowded into already very crowded channels. These dangers can be obviated only by a greater increase in commercial and manufacturing activity, in other words unless we are visited within the next six months with an unusual activity there will not be remunerative employment for all the capital, labor enterprise or of looms, wheels and forges. For the first time in three years the country is coming in sight of a possible over-production or of an over-producing era. The danger is as yet remote. A number of influences may likely arise to hasten its coming. The leaders in commerce and transportation are recognizing the danger, and, in a way, are endeavoring to avoid it. The bulk of attention, however, is given to mere political trifles which effect the success of one side or another of the political parties. The bulk of the speculative element of the country are looking for immense crops. The average manufacturer of the country is looking simply for big fall orders, the average farmer is looking for a heavy demand for his products. The cotton-growers are agitating themselves to see how they can avoid being fleeced by the Bagging Trust. The mining interests are looking forward with more confidence than they have for months to a heavy and more remunerative demand. There are behind all these great interests two or three causes quietly at work which may strengthen the situation and improve their chances, or which may destroy the anticipation of the controllers of these great interests. The comparative steadiness of values during the past year or two has been a source of considerable confidence. Some influences are now at work that may overturn this confidence. The trade organizations that exist to restrict production and fix prices have done much, but they are reaching a point where their control is in jeopardy, hence the organization of trusts. The supply of foreign capital is relied upon by American managers to enable them to pull through safely another year to steady values and create commercial activity. The banking interests predict that there will be no scarcity of money, and that there will be no serious decrease in the ability of borrowers to pay their loans. The exporters state that there will be fully as large a demand for our staple products as there has been in any past year. They figure out that cotton, wheat, oil, grain and our other articles of chief export will be in as great demand as heretofore, and sell at as high prices.

The promoters of new enterprises throughout our own country estimate that the demand next year for all kinds of products will be ten per cent greater than this year. The rank and file of the manufacturers of the country entertain the same opinion. It is shown in their quiet increase of capacity and in their substitution of new machinery for old, and larger and better engines for older and smaller ones. The manufacturers of textile goods have steadily improved their capacity. Not in every town and city but in the aggregate there has been almost as much increase in capacity as last year. The boot and shoe manufacturers have more idle capacity this year than last because they have put in more machinery and have increased their producing power. The paper makers and hardware manufacturers, electrical machinery manufacturers, boiler and engine makers have all increased their capacity and at the present time, according to the statements of some of the leading authorities in these industries, there is a stronger inquiry for future supplies and stocks than there has been since the opening of the season. While there is dulness in the iron trade there is activity in the shops where iron and steel are worked up into practical shape. In the West the agricultural implement makers have been liberal buyers of steel. The manufacturers of pipes and tubes have been during the past two or three weeks the buyers of a great deal of material. The manufacturers of wood-working machinery have been rather slack for some months but orders for the past two or three weeks have encouraged them to increased efforts. The building of elevators in the Northwest it is said will receive a sharp stimulus this fall through the heavy demand for cereal products. Western architects and builders give their favorable opinion to this prophecy. The manufacturers of lake craft between Buffalo and Duluth are making contracts which will keep the boat and ship building capacity of the lakes remarkable busy in the next few months. New pipe lines are to be built and this will help the iron trade. Quite a number of railroads in the far West will place orders for cars to a large amonnt just as soon as their managers see prospects of a termination of the present conflict of interests. The smaller industries thoughout the West have during the past two weeks felt a little improvement in the way of urgent orders for work for early delivery. Jobbers in Boston, New York and Philadelphia have recently had some encouragement in the way of duplicate orders for the early delivery of staple goods, whether it to be for locomotives or for cotton goods there is a stronger inquiry and demand at the opening of September than there has been at any time since April last. Business men find themselves, relatively speaking, better off than they were inclined to anticipate when they took into account last spring the vague dangers of the campaign. The country has been a good buyer in all branches. The managers of our industries have done exceeding well. The workman have acted wisely. Trade has been seeking new fields and our general market has been quietly enlarging itself. West of the Mississippi trade has doubled itself since 1885. Southern trade has been quadrupled in four years, so say some of our enthusiastic staticians.

S. J. Parkhill & Co., Printers, Boston.

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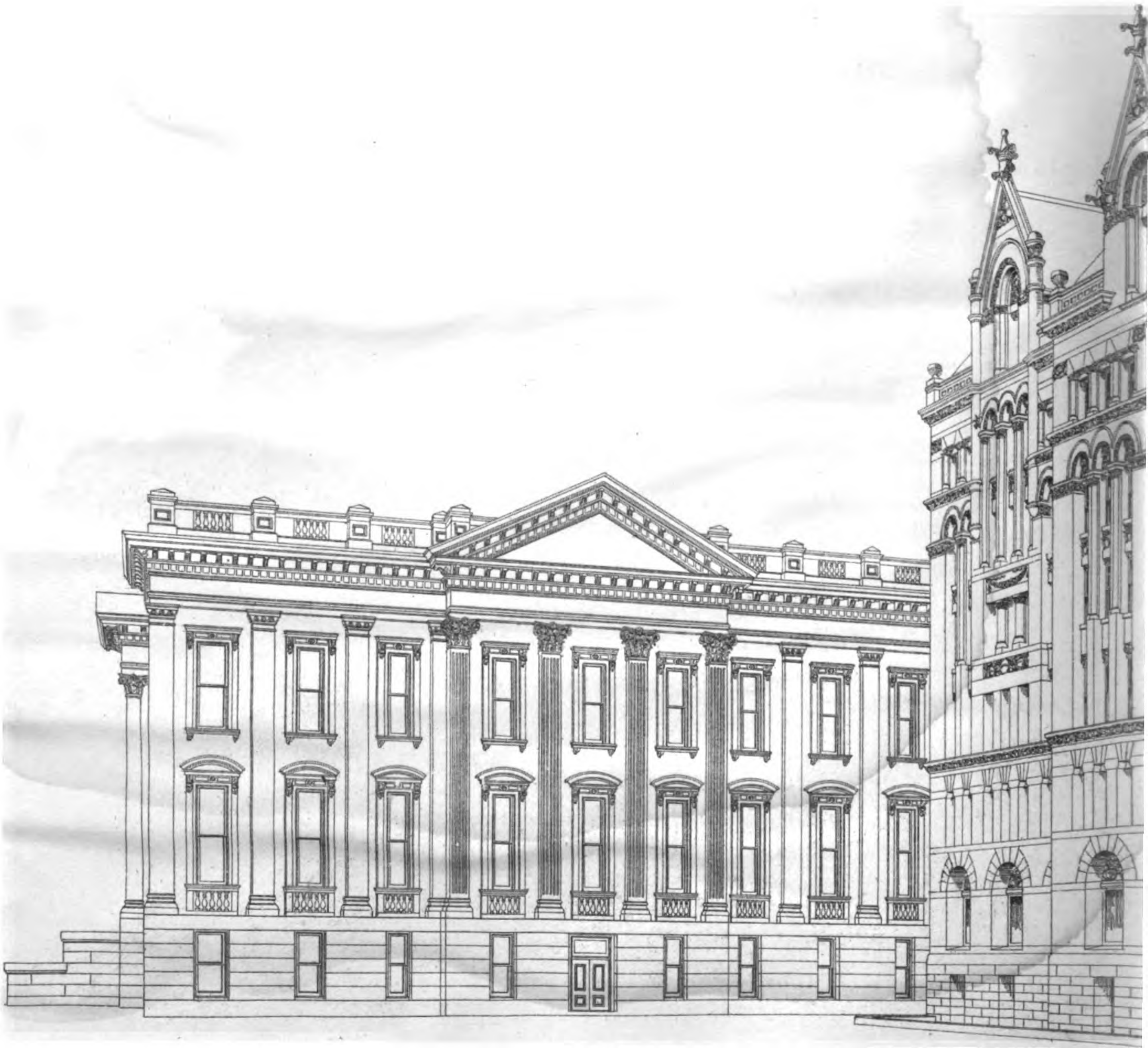
VIEW FROM THE NORTH-WEST.

"VITRUVIUS."

Cyrus F. Dean.

NEW YORK CITY OFFICE COMPETITION.



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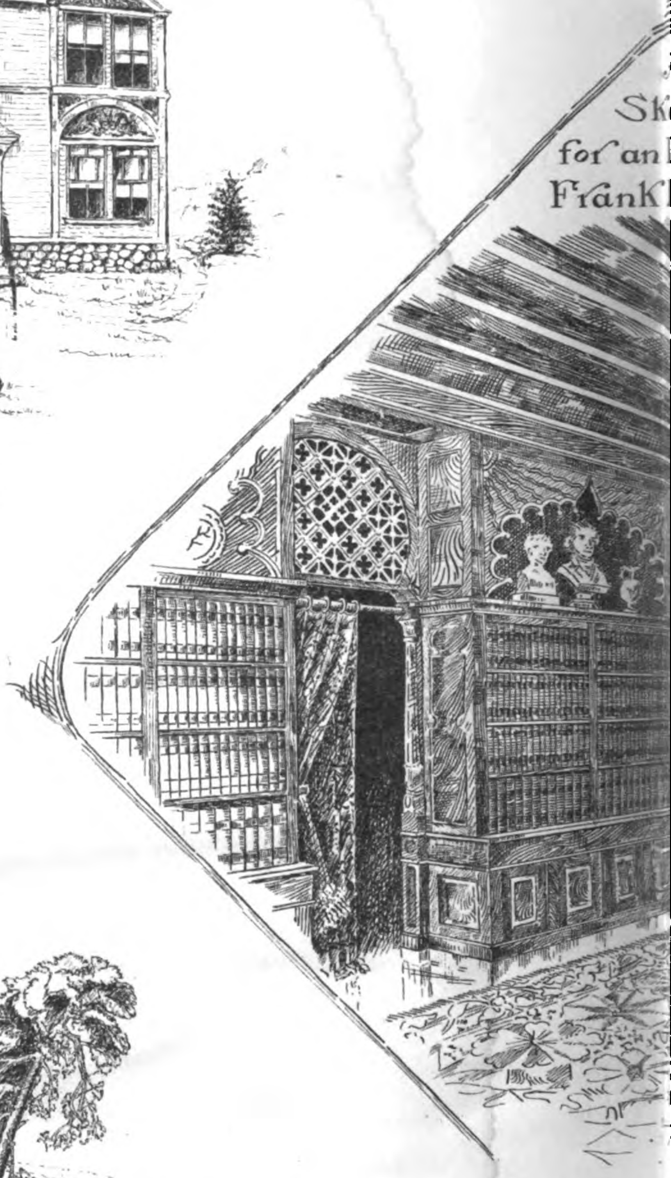

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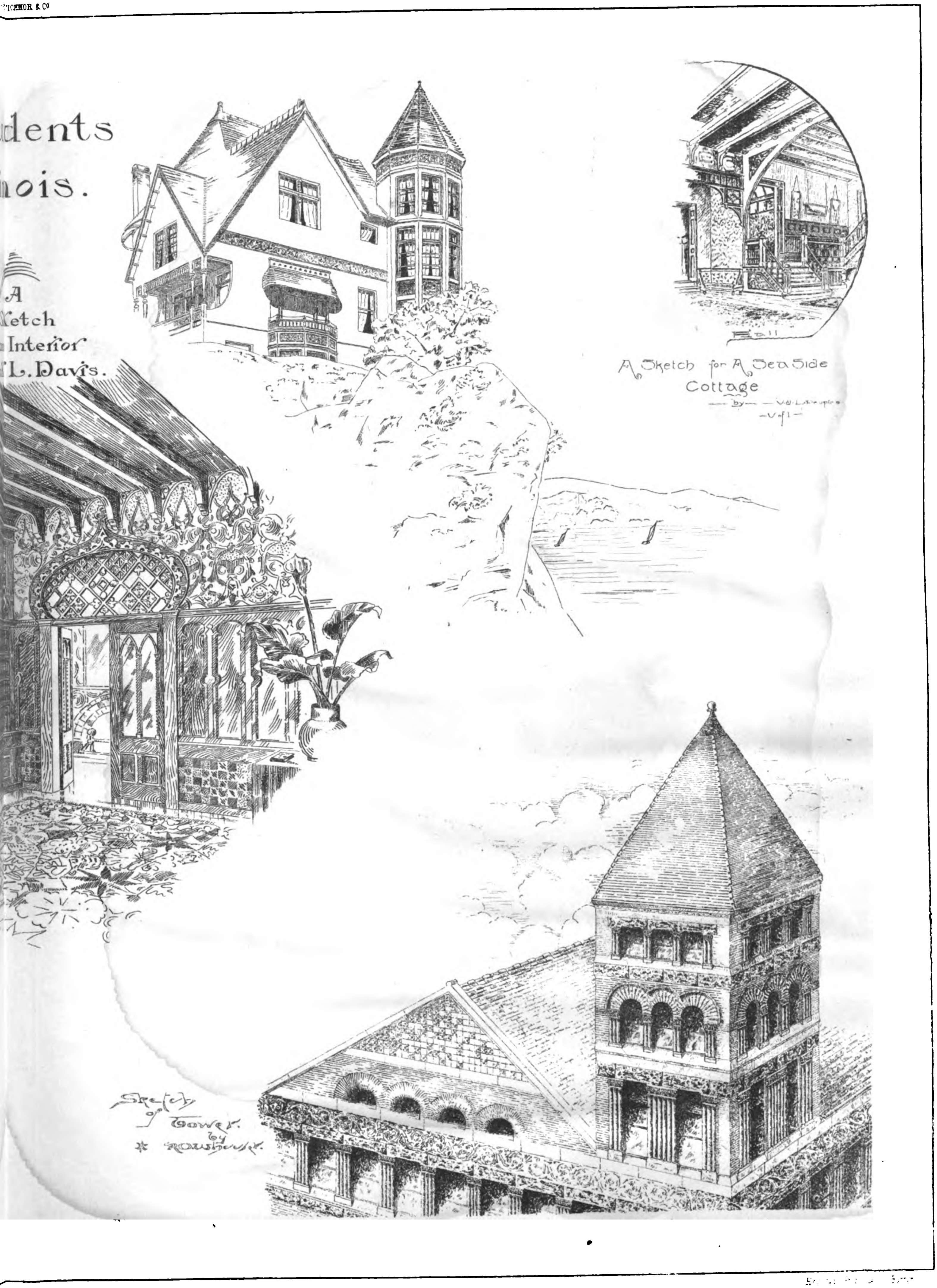
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A Sketch for A Sea Side Cottage
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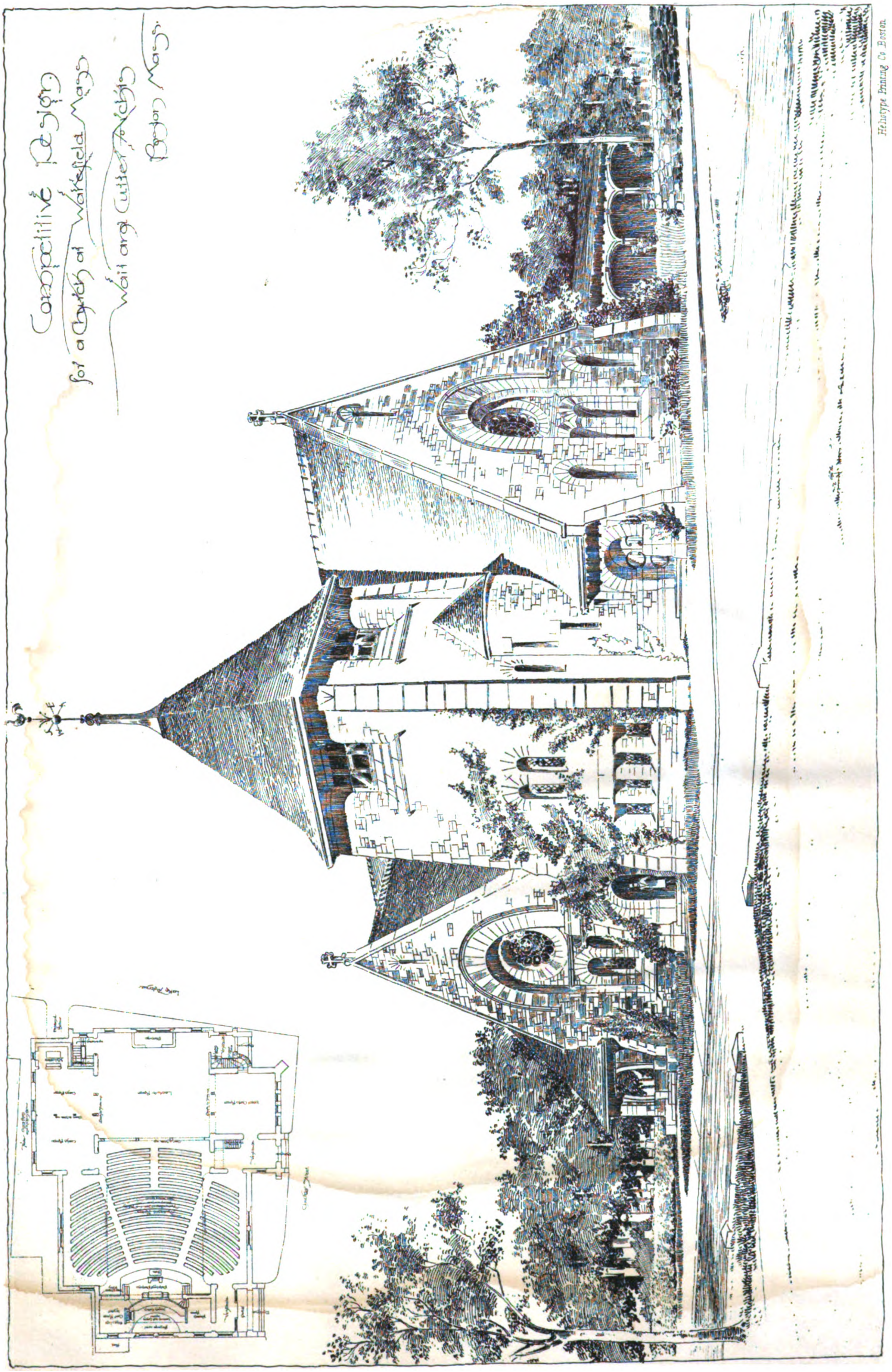

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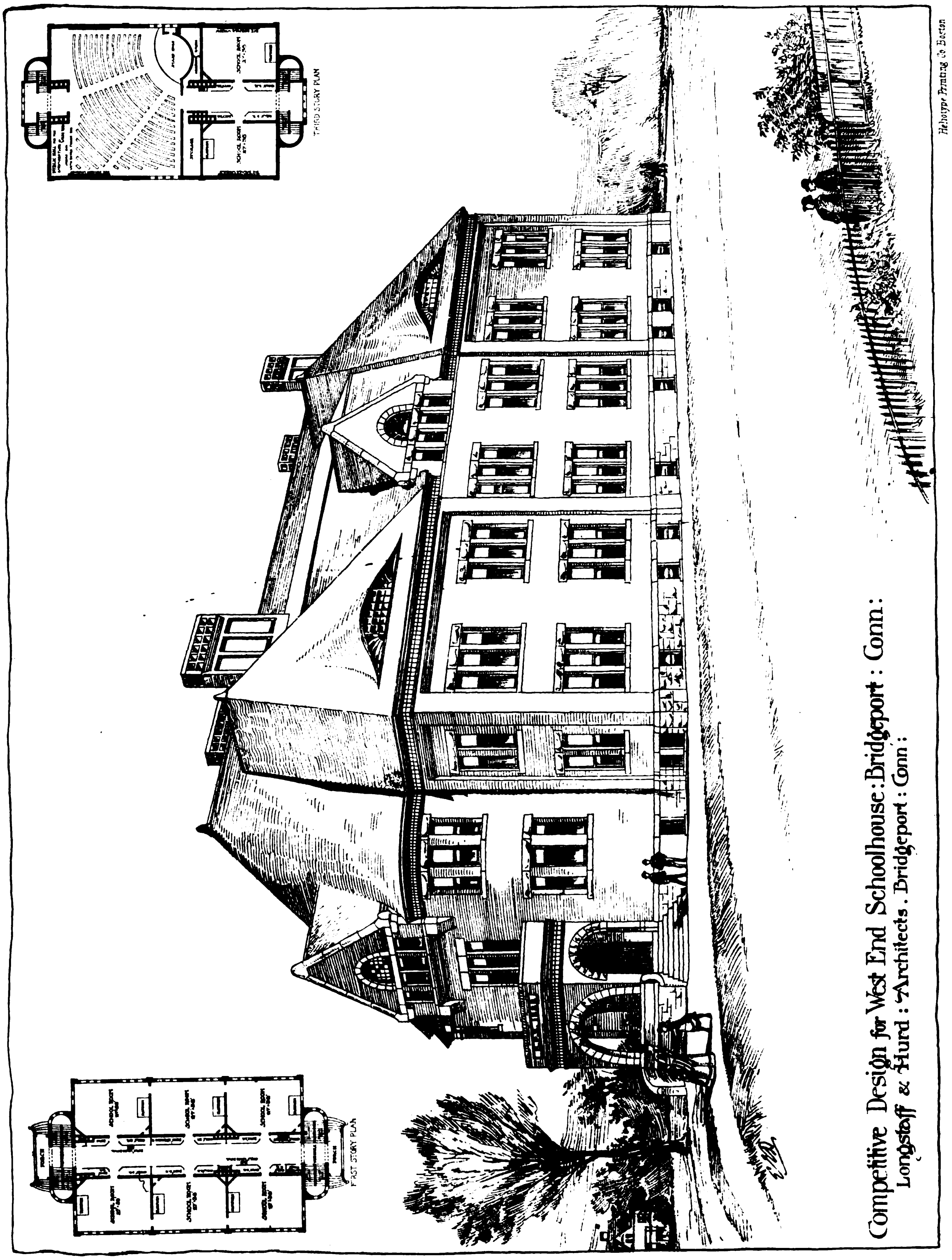

Competitive Design for West End Schoolhouse: Bridgeport: Conn:
Longstaff & Hurd: Architects. Bridgeport: Conn:

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With this material wood-work can be thoroughly protected from fire at a cost of less than one cent per square foot.

It can be had in all colors at 30 cents per gallon.

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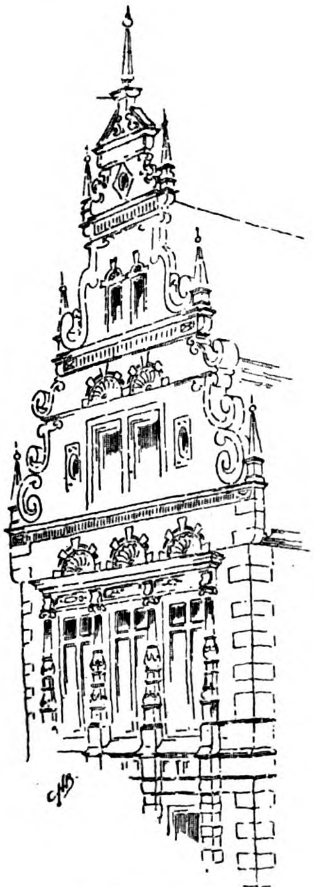
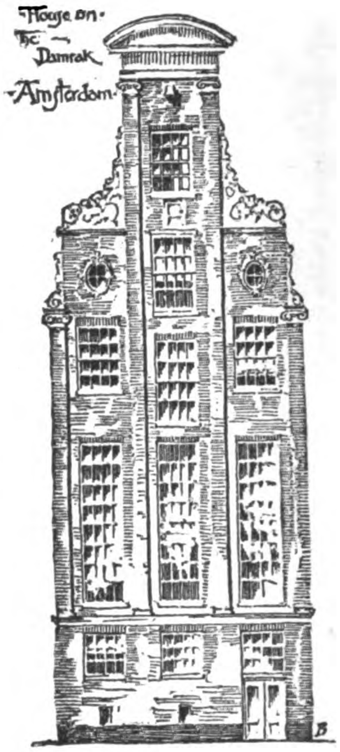
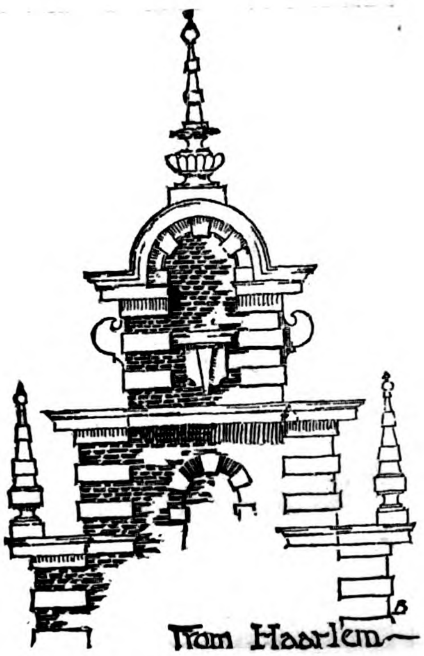
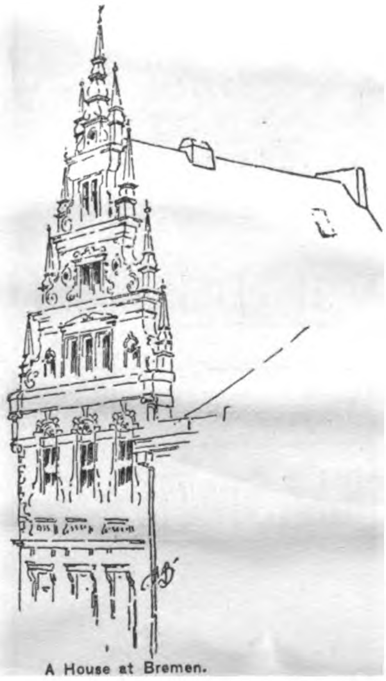


A House at Bremen.







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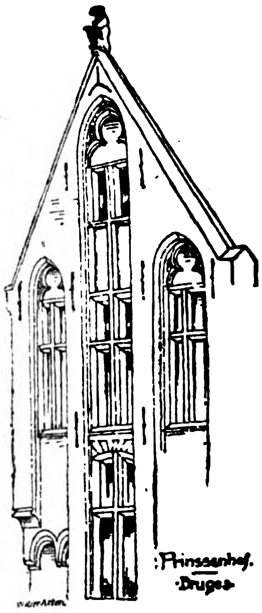

GABLES AND PEDIMENTS.

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The American Architect and Building News.

Vol. XXIV. Copyright, 1888, by Ticknor & Company, Boston, Mass. No. 663.

SEPTEMBER 8, 1888.

Entered at the Post-Office at Boston as second-class matter.

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Some little comment has been made upon an article published in a Boston newspaper, which mentioned that a certain architect of considerable note in that city had closed his office, and abandoned his profession, to accept a Government position, at a salary of twenty-five hundred dollars a year; while two others had made application for official positions at salaries of fifteen hundred dollars a year. The newspapers seem to think that architects must be persons of very little courage or manliness, if three of them in a single city, who ought, as the journal which published the story informs us, to be "able to earn an income of five thousand dollars a year," are willing to give up this attractive prospect for a certainty of half or a third of that sum; and it seems only fair to come to their defence by pointing out that the probability that any architect in an American town will ever be able to earn five thousand dollars a year by the practice of his profession is extremely small, and that the gentlemen in question, who were more likely to understand the circumstances than any one else, probably did what was most prudent for them.

It would do no harm to have the public understand a little better than it now does the smallness of the pecuniary rewards which come to architects. There is no profession whose members are so savagely plundered and cheated by those whom they try their best to serve, yet there is perhaps no profession, except that of the ministry, whose members, in this country, at least, have incomes so uniformly modest. Although the great competition among lawyers keeps the younger ones poor for a few years, they may look forward hopefully, if they persevere, to revenues from fees and trusts which will make them rich before their middle life is past, while even physicians, whose income is said to be, on an average, smaller than that of any other professional men, may reasonably hope for a practice of ten or twelve thousand dollars a year as the result of exceptional ability and industry. With architects the state of affairs is very different. We are strongly inclined to believe that the number of architects in each large American city whose income from their profession amounts, on an average, to five thousand dollars a year can be reckoned on the fingers of one hand, and that the few architects who earn more than this are not always those whose careers do most to bring credit to their profession, or to advance the cause of art. Why this should be so, it would be interesting to inquire. The civil engineers, whose method of service resembles that of architects, are much more successful in getting properly rewarded for it. One reason for this is that important engineering works are always left under control of their designers, who are paid in proportion to the skill and responsibility involved, while the execution of a large building is in this country accompanied with an amount of gratuitous interference and imposition which reduce the margin which an architect can save for himself after paying his draughtsmen to very small proportions, even if he has not been bullied or deceived into accepting an inadequate compensation at the outset. It is impossible for us, Americans, not to feel a little envy of the more prosperous practice of architects abroad. It is true that competition is greater there, but the rewards of the successful men are also far greater. As the cost of building is greater in Europe than in this country, the architect's income from commissions of the same number and importance is larger there than here, while the expense of living is much less. Moreover, the excessively costly offices maintained here, with their scores of draughtsmen at salaries ranging from ten to a hundred dollars a week, are unknown abroad, where an architect of reputation can have his choice of articled pupils who render him skilful and enthusiastic assistance, and pay him a large sum for the privilege of doing so; and, distances being comparatively trifling, while clerks-of-works are always kept, at the owner's expense, on buildings of importance, a busy architect, instead of having to spend almost his whole time in racing around the country in terror lest one of his buildings should come to grief before he can see it again, has plenty of leisure to do his own designing, even to the details of the mouldings and sculpture. Again, not only are the architect's office expenses light, but his pay is more certain, and, in important works, usually greater. There are few architects in this country who could command the full commission of five per cent for a building costing ten or twelve million dollars, which is given as a matter of course abroad to any architect who should show himself capable of designing such a structure; and if it were given here, it would be so loaded with conditions compelling the architect to pay the clerk-of-works, or to give bonds for the completion of the building within the contract price, or a dozen other matters, as to reduce the architect's profit to a small sum, and burden him with exactions which would prevent him from doing more profitable work. In England a man like Street has no difficulty in carrying on simultaneously the Law Courts and several other important buildings in different parts of the country, making all the perspective studies, and, in the case of the Law Courts, at least, all the drawings for mouldings, capitals and details of every kind, with his own hand, reserving at the same time leisure for daily exercise and recreation, and, in the hot season, leaving his buildings, safe in the charge of a clerk-of-works, for whose actions he assumes no responsibility, to enjoy a month or two of sketching on the Continent. With us such a professional life would be utterly out of the question. The only way in which an architect here could get a month's vacation from his business in summer would be either to have no business, or to divide it with a partner; yet the reward of the best American architect's years of unremitting toil and anxiety, if he is so fortunate as to find constant employment, is a decent living for himself and his family, while Street, Scott, Waterhouse and others, by middle life, have become very rich, Royal Academicians, and distinguished members of the most distinguished society, and their rivals on the Continent get, in addition, orders, and titles of nobility.

The public is certainly to be congratulated on the resolution which has recently been taken by the managers of the Pennsylvania Railroad, to rebuild all its bridges of short span in brick or stone, instead of iron. The weight of locomotives has increased so much of late years that iron bridges which were built with a large margin of safety are now dangerously tried by the trains passing over them, and the expense of inspection and repair of iron bridges represents a large interest on their cost. For these reasons the engineers of the road have decided that brick or stone arches, although much more expensive in the first instance than iron trusses, will be cheaper, as well as safer, in the end. Aside from their greater safety, however, bridges of masonry have the æsthetic advantage of being usually interesting, and often very beautiful objects, while iron truss bridges have never yet been endowed with anything more than an engineering attraction. The roughest stone arch across a roadway presents a beautiful combination of lines, a fine contrast of light and shadow, and a

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picturesque effect of landscape beyond, together with an expression of quiet durability which is more needed in our architecture than any other artistic quality, and the more important examples, such as the viaducts which are sure to be soon required at the entrance of railways into towns, may become works of the highest art. In many cases they are likely to be made so, if we may judge from the present tendency of railroad managers to seek the assistance of architects for giving their permanent structures an attractive air. Already our country railway-stations, under professional care, are fast becoming transformed from hideous sheds, covered with clapboards, into charming buildings of stone, picturesque, solid and convenient, often quite richly decorated, and generally surrounded by pretty and well-kept gardens. The better class of these new stations in this country are far more beautiful than those of foreign roads, and if the design of the bridges could be brought up to that of the stations, the line of every well-managed road would furnish a route of considerable artistic interest.

M. DETAIN sends to *La Semaine des Constructeurs* one of his sensible letters on granite, or rather on the causes of discoloration of granite by rust, and the methods of preventing and removing this discoloration. In most granite countries a certain amount of iron is scattered through the rocks beneath the surface of the earth, usually in the form of sulphide, crystallized in the well-known cubical, gold-colored particles of iron pyrites. The crystals of pyrites occur in many other rocks besides granite, more particularly, perhaps, in slate and coal, and are frequently supposed to be gold. Wherever they occur, they decompose on exposure to the weather, leaving ultimately a free oxide of iron, which is washed by rain over the surface of the stone. Many white or mottled marbles also contain iron, which slowly imparts to the surface, under the action of the weather, a warm burnt-sienna color. This is not a serious disadvantage to marble, but in granite the iron stain combines disagreeably with the natural color of the stone, and granites containing iron particles should be rejected. According to M. Détain, the French granites of a dark-gray color are rarely, if ever, affected by rust. Those with white ground are more apt to contain iron, but are tolerably safe; while those with pink or red ground are almost sure to rust. With us, red granites are no more subject to rust stains than others. There are some red granites which contain iron, but there is at least an equal number of gray and white stones with iron particles in them, and as these soon assume an unpleasant appearance on exposure, new granites should be tested. The best test, and one which cannot be too strongly recommended to architects who have occasion to try a new stone, consists in a visit to the quarry, where its merits and defects may, with a little care, be ascertained with certainty; but washing the suspected stone with muriatic acid, and allowing the acid to dry on, will often bring out the color of iron. Singularly enough, the same means answers for removing the rust stains which have already formed on a stone. The muriatic acid readily dissolves the rust, and if it is then washed off with plenty of clear water, the stain will disappear until atmospheric influences have produced a new coat.

WE do not often have occasion to reproduce legends in these pages, and legends do not often have architects for heroes, but having come upon a pretty one which will be new, we imagine, to most of our readers, we reproduce it for hot-weather entertainment. The story is Roumanian, and is to be found in Madame Gérard's "*Land beyond the Forest.*" According to the ballads familiar all over the province, the great Hospodar Negru, one of the principal characters in Roumanian history, while detained in Constantinople as a hostage, occupied himself in studying Oriental architecture, and became so expert that he himself directed the building of a great mosque, which had nine hundred and ninety-nine windows, and three hundred and sixty-six minarets. The Sultan was so delighted with his success that he set him at liberty, and presented him with all the rich materials left over from the building of the mosque, so that he might construct a church with them in his native country. Negru took with him, therefore, not only the materials, but nine master masons, and the Greek architect Manolli. On reaching home, Negru, according to the legend, goes in search of a site for his new church. A shepherd boy tells him that near the River Arghisch, in a dark thicket, he has seen an old ruined wall, at sight of which his dogs fled, howling. Negru looks upon this as a supernatural direction, and leads his band of masons to the spot. Work is immediately begun, but the Christian ground refuses to support the Moslem materials, and whatever they build during the day is overthrown at night. The Prince is furious, threatening the masons with instant death if they do not build the wall so it will stand, and they are in despair, when Manolli has a dream, in which he is told that if the first woman who comes near the next day is seized and built into the walls the celestial wrath will be appeased, and the work will stand. On waking, he relates his dream to his assistants, and binds them by a mutual oath to obey the divine direction. At sunrise Manolli mounts the staging, fearing to see some victim. He hears sweet singing, and a little way off his eyes fall upon his wife, Annika, bringing him bread and wine for his breakfast. In terror he falls upon his knees and prays for a flood to keep her from reaching the building. His prayer is granted, and a torrent rushes down the river-bed, but Annika bravely presses on, wading through the stream to reach her husband. Manolli prays again for a hurricane, and again his prayer is granted, and a furious wind bends the pine trees, almost carrying Annika away, but she resists and struggles on, until she reaches the walls. The other masons, relieved from their own fears, piously rejoice at this heaven-sent sacrifice, and Manolli, sadly kissing his wife, carries her up to the scaffolding, and places her in a niche. The masons tell her that they are going to pretend to build her in as a joke, and Annika stands quietly until she is held fast. Then she cries to Manolli to release her, but the masons work on relentlessly, and the walls rise rapidly, while her dying voice still sounds from within them. The Hospodar, finding the work going on so prosperously, asks the men if they could ever build a still more lofty and beautiful church. At their reply that they think they could do so, he begins to fear that they will go and work for some of his rival princes, and makes sure of preventing them by removing the ladders. The men, finding no other way to escape, make for themselves wings out of the shingles provided for the roof, and jump down, but the wings fail to work as they should, and the nine masons on striking the ground are killed, and turned into stones. Manolli also leaps, but at the moment, hearing from within the wall the voice of his poor wife calling to him, he bursts into a flood of tears, and striking the ground like the others, he becomes a spring of water, which is still flowing, and bears to this day the name of Manolli's Well.

THE Prize of Rome for 1888 has been awarded to M. Joseph-Albert Tournaire, of Nice, a pupil of M. André. We find an interesting illustration of the system of the Ecole des Beaux-Arts in the fact that M. Tournaire was second in the competition for the Grand Prize in 1882, and, after so nearly winning it once, has worked patiently for six years before his final success. Judging from the time usually necessary to enable a student in the school to win even a second Grand Prize, his course must have lasted at least ten years, and he has five years more of student life before him at the Villa Medici. For all this M. Tournaire, who is now in his twenty-seventh year, is rather a young man to have reached the highest academical honor, and he must have been an exceptionally brilliant student to gain the second place six years ago. The second in rank this year is M. Sortais, pupil of MM. Daumet and Girault, who gained the third position in 1886; and the third is M. Huguet, pupil of M. Blondel.

SOME venders of modern antiquities have come to grief in Paris, greatly to the satisfaction of collectors. It seems that some time ago a quantity of objects of antique art in gold and silver were imported into France from Germany, where they had just been made. The French custom-house officers, not knowing of any law to justify them in seizing the counterfeits, as they had not been offered for sale, and were presented to them under their true character, as German manufactures, were obliged to be contented with stamping on each a mark by which it might be subsequently known. Sometime later, specimens were ascertained to have been sold, in which this mark had been altered into a sort of antique cipher, and the sellers, three Parisian bric-à-brac dealers, were arrested and heavily fined.

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BUILDERS' HARDWARE.[1] — V.

BOLTS.

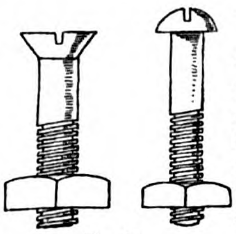

Fig. 23.

ASIDE from the coach or lag screws, and the stair-rail bolts already described, the only constructive bolts used by the builder are such as are necessary in joining header and trimmer beams. These are similar to the stair-rail bolts, but heavier and less finished. They are often made to order, but a few sizes are kept in stock by some dealers. Ordinarily $\frac{1}{2}$ to 1 inch bolts are used, 8 to 24 inches long, with a square head on one end and a thread and square nut at the other. In any other cases requiring the use of constructive bolts, lag-screws are generally found to answer every purpose, though stove-bolts, Figure 23, are sometimes useful. These are made with flat or round heads. They are manufactured in six diameters, from $\frac{5}{32}$ to $\frac{5}{8}$ inch, and thirty-two lengths, from $\frac{5}{8}$-inch to 7 inches. The manufacturers' list-prices are from \$0.85 to \$4.20 per hundred. Sink-bolts are similar to the stove-bolts except that the shank is threaded the whole length, and provided with two nuts. Tire-bolts are like flat-headed stove-bolts, but are without the cross-cut in the head. Many other forms of bolts are in the market, but even the foregoing are rarely used by builders.

DOOR-BOLTS.

Figure 24 shows the most common form of wrought-iron door-bolt, designated specifically as a "barrel-bolt." This is made to screw onto the face of the door. The jamb-staple may be plain, as in Figure 24; bent, Figure 25; or necked, Figure 26. The latter is for a door swinging out, which is to be bolted on the inside. All of these forms are likewise made in cast brass. The iron bolts may be japanned, tinned or bronzed, and the knobs are sometimes nickel-plated, tinned, or made of brass or porcelain. Neck-bolts, Figure 27, are used when the bolt-plate or staple cannot be put directly on the line of the face of the door. The style shown by the illustration is that manufactured by the Stanley Works, and is made additionally strong by a central rod running into the bolt and riveted to the edge of the bolt-plate as shown by the figure. A similar style of bolt with a flat bar and a raised end instead of a knob, Figure 28, has a flat spring between the bolt and the plate, serving to keep the former in position.

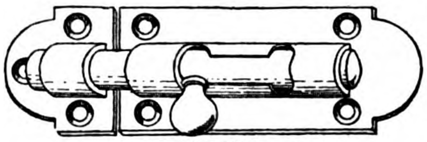

Fig. 24.

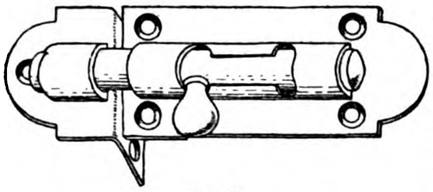

Fig. 25.

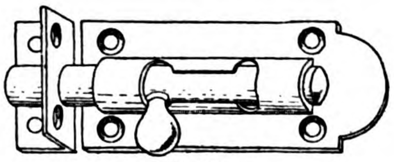

Fig. 26.

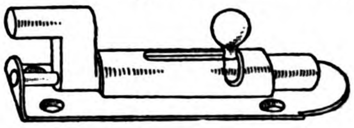

Fig. 27.

Figure 29 shows a form which is designated as a mosquito-bar bolt, and is used for a number of light purposes. It is made without any jamb-staple.

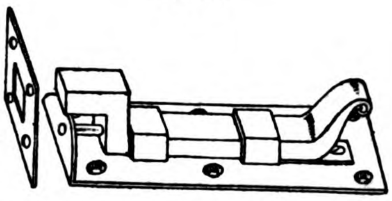

Fig. 28.

Excepting Figure 28, the foregoing bolts are made without any springs. Much the same patterns are found in the market under the designation of spring-bolts, the bolt being held either open or shut by means of a spring inserted under the bolt against the bolt-plate. These are in a number of varieties, including neck-bolts, straight-bolts, square or round bolts, with porcelain knobs, brass knobs, etc. Figure 30 shows a form of square spring-bolt manufactured by the Stanley Works. There is also another form, Figure 31, in which the spring is on one side of the bolt, the notch in the shank holding the bolt either open or shut.

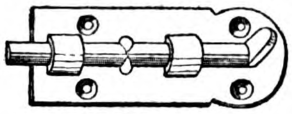

Fig. 29.

Straight cupboard-bolts, Figure 32, and flat cupboard-bolts, Figure 33, are manufactured in a variety of forms of which those shown are types. They are finished in the usual variety of styles. Figure 34 shows what is designated as a ship-bolt. Figure 35 is a variety of side flush-bolt adapted for chests, desk-tops, etc.

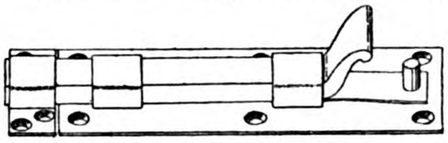

Fig. 30.

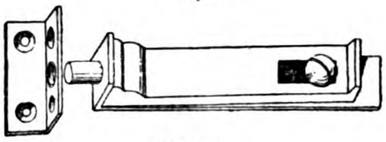

Fig. 32.

Figure 36 and Figure 37 are two forms of bookcase-bolts. The former is screwed flush on the edge of the standing-door at the top, while a flat plate is attached to the edge of the swinging-door. On closing the latter, the brass plate strikes on the knob of the bolt and throws the bolt up into the door-soffit, the knob shank following the oblique cut in the plate; a

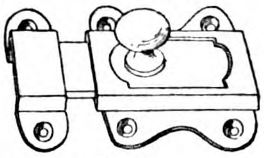

Fig. 33.

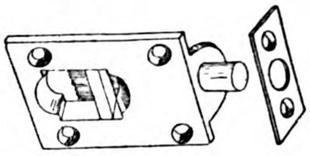

Fig. 34.

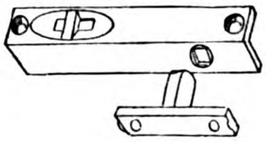

Fig. 35.

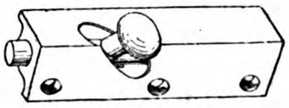

Fig. 36.

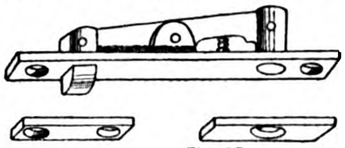

Fig. 37.

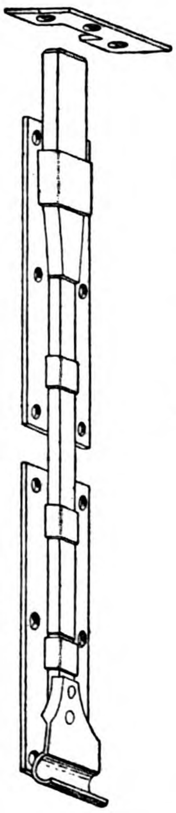

Fig. 38.

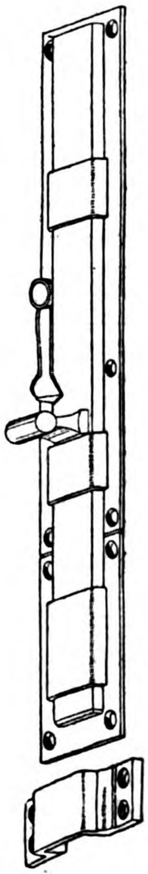

Fig. 39.

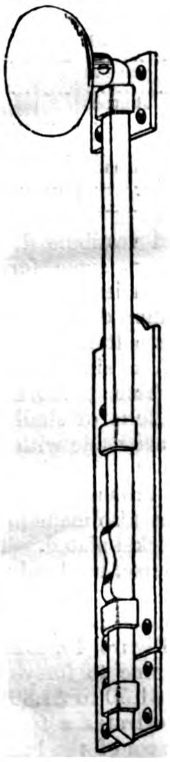

Fig. 40.

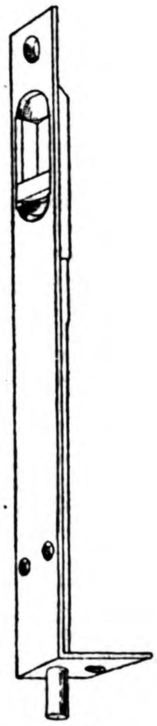

Fig. 41.

[1] Continued from No. 661, page 85.

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spring throws the bolt down when the door is opened. The action of Figure 37 is somewhat different. The bolt is mortised into the soffit or the bottom of the door-frame, and the two plates are screwed to the tops of the doors. For a bolt as shown by the figure, the right-hand door is closed first, when the other door is closed it strikes the bevelled connection of the bolt, forcing it up and consequently forcing the other arm of the bolt down into the plate on top of the right-hand door. The doors can then be locked together with a key or catch, though the friction on the striker will keep them closed. A spring forces the bolt up when the left door is opened. This form of bolt can be used for cupboards, wardrobes, etc., but we do not know of its having ever been applied successfully to large double-doors.

Flat-tail-bolts, Figure 38, are intended for high doors requiring to be bolted at the top, and are made in a number of different lengths, from one to seven feet. When the bolt is shot it is kept from slipping down by a rebate in the shank which catches on the lowest staple, as seen by the figure. Figure 39 is a form of bolt used for shutters having a wide bearing on each side. It is provided with a locking lever at the upper side, catching in a notch on the bolt. The same form is made without the locking-lever. Canada-bolts, Figure 40, consist of a long, square shank or bolt, with mineral or porcelain knob. The bolt is kept from slipping by a short, flat spring underneath. These are sold with several varieties of staples.

The following table gives the average retail prices of the bolts previously enumerated. Only the principal sizes are listed, but these will be sufficient to give an idea of the cost.

TABLE OF PLAIN BOLTS.

Prices per dozen.

Fig.	Length in inches.	2	2½	3	4	5	6	8	12	36	84
		$	$	$	$	$	$	$	$	$	$
24	Wrought-iron barrel-bolt common staples	....	....	1.10	....	....	....	3.25	....	....	....
25	Wrought-iron barrel-bolt bent staples	....	....	2.25	....	....	....	4.00	....	....	....
26	Wrought-iron barrel-bolt necked staples	....	....	1.15	....	....	....	3.40	....	....	....
27	Wrought-iron round, neck bolts	....	....	....	3.10	3.30	3.50	....	....	....	....
28	Wrought-iron square, neck bolts	....	....	....	2.45	....	3.65	4.70	....	....	....
29	Brass mosquito-bar bolts	1.05	....	....	....	....	....	....	....	....	....
30	Wrought-iron, square, spring bolts	....	....	1.20	1.50	1.60	1.70	2.40	....	....	....
31	Wrought-iron side spring bolts	....	....	....	....	....	....	5.95	....	....	....
32	Brass straight cupboard-bolts	1.50	....	2.15	....	....	....	....	....	....	....
33	Brass flat cupboard-bolts	....	.88	....	....	....	....	....	....	....	....
34	Brass ship flush-bolts	2.40	....	....	....	....	....	....	....	....	....
35	Brass side flush-bolts	....	2.10	....	....	....	....	....	....	....	....
36	Brass bookcase-bolts, one size	2.10	....	....	....	....	....	....	....	....	....
37	Brass bookcase catch one size	2.10	....	....	....	....	....	....	....	....	....
38	Wrought-iron flat-tail bolts	....	....	....	....	....	....	....	10.20	....	26.25
—	Wrought-iron shutter-bolts plain	....	....	....	....	....	1.40	1.83	2.68	....	....
39	Wrought-iron shutter-bolts with lock	....	....	....	....	....	1.49	1.92	2.77	....	....
40	Wrought-iron Canada bolts	....	....	....	....	....	2.80	....	....	4.32	....

For front and vestibule doors in two folds as well as for other double doors some form of mortise-bolt is required. These may be mortised into the edge or sunk flush with the face of the standing door. Figure 41 shows the ordinary sunk flush-bolt. This pattern is made with plates three-fourths inch wide and bolts from six to twenty-four inches long. The retail prices average from $5.60 to $9.52 per dozen in bronzed wrought-iron. Bolts of similar description but with a square rod, Figure 42, are made with plates one and one-fourth inches wide and fifteen to sixty inches long, costing $9.80 to $23.60 per dozen in bronzed iron, with bronze knob. The same styles of bolts are also made in cast brass; a few dealers keep them in stock nickel-plated. The pattern represented by Figure 42, is, of course, used only on the face of a door.

A mortise flush-bolt is one which is mortised into the thickness of the door and is operated by a knob or handle working in a face-plate, Figure 43, illustrates one variety. The bolts are made from nine to forty-eight inches long, and the retail prices are from $1.50 to $1.80 each, in bronze.

Figure 44, illustrates a form of self-locking flush-bolt. A lever on the bottom of the bolt catches over a shoulder on the face-plate when the bolt is shot. To release the lever it is simply pushed inward, a coiled spring at the top otherwise holding it in position. Figure 45, shows another device in which the bolt is thrown by turning the knob. A peg at the back of the

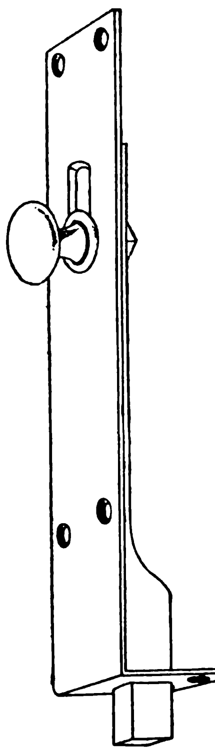

Fig. 42.

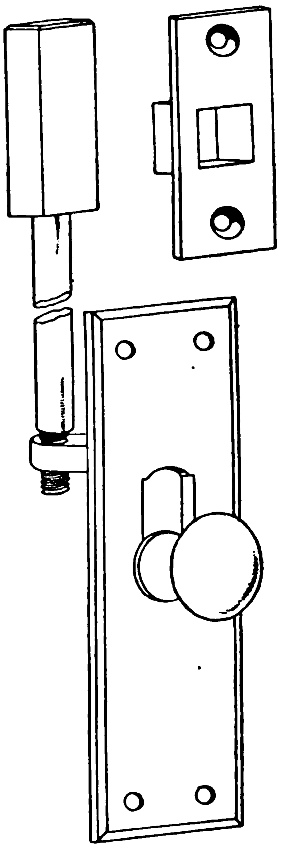

Fig. 43.

knob works in a horizontal slot in a tail-piece attached to the bolt. Raising the bolt brings the peg in the line of the centre of rotation of the knob and so locks it.

There are several varieties of latch spring flush-bolts, in

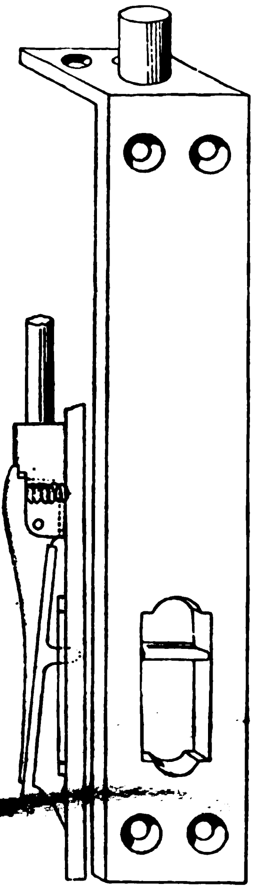

Fig. 44.

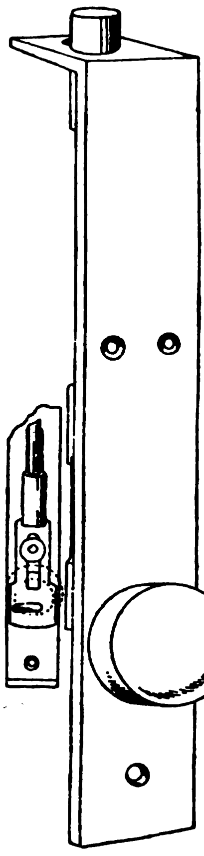

Fig. 45.

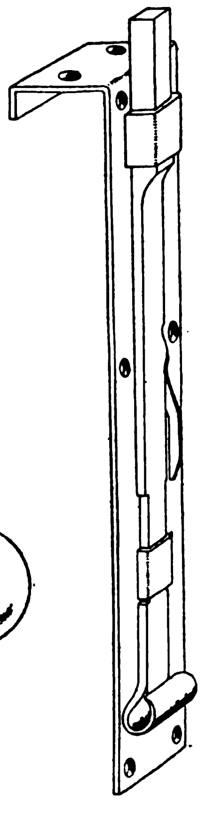

Fig. 31.

which the knob remains thrown out but can be drawn down by a pull within convenient reach of the hand. Figure 46 illustrates one such arrangement. P. & F. Corbin also manufacture

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a latch-spring bolt which is mortised into the edge of the door, and in which the latch bolt is released by pressing on the face-plate.

For store doors it is customary to use bolts applied to the face of the door instead of being mortised-in flush. In this case the upper bolt is attached to a chain which hangs about six feet from the floor. The lower bolt is held up by a spring, but can be pressed down into place with the foot, a spring catch on the face holding the bolt when down.

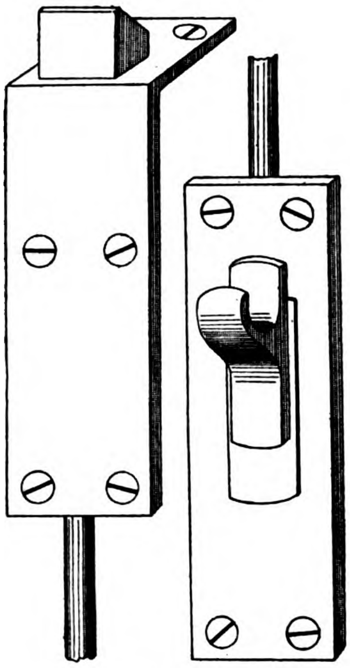


Fig. 46.

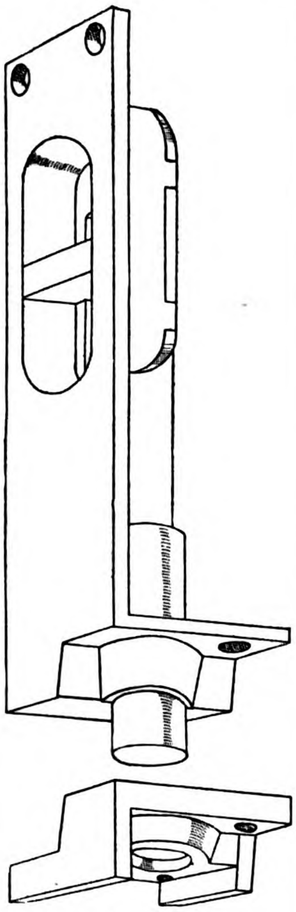


Fig. 48.

Figures 44 to 46 inclusive, are types of a great variety of styles manufactured in several different metals with all kinds of finish and design. It is, therefore, impracticable to give for these any average prices which could serve as fair criterions.

The Hopkins & Dickinson Manufacturing Co., have recently put on the market a form of flush-bolt intended specially for Dutch doors, that is to say, doors in two folds, horizontally. Figure 47 illustrates this. The bolt-plate is about seven inches long, and is rebated to match the rebates of the doors. The retail price of a single bronze bolt is $2.50.

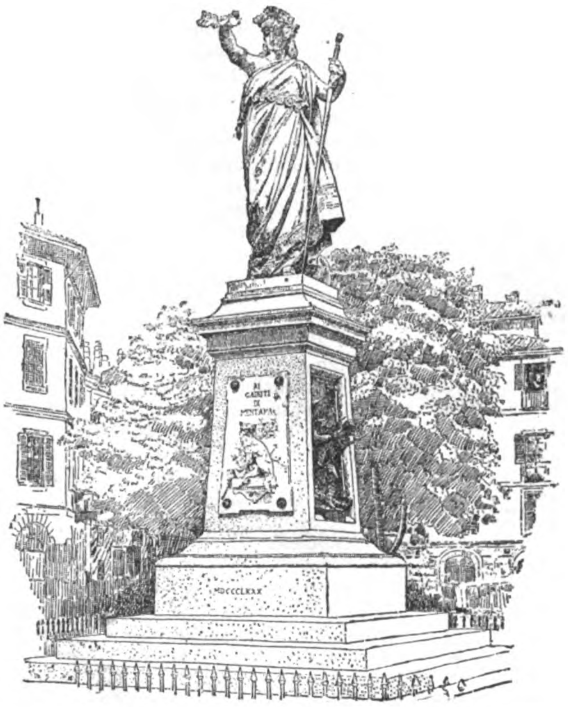
Engine-house bolts are made in a variety of forms generally so as to permit of being opened easily, by a large catch or latch which throws the bolts up and down from bottom and top. These cost from $6 to $9 each, though it is impossible to give any fair general price as the bolts are made only to order.

[To be continued.]

AN ARCHÆOLOGIST'S ACUTENESS. — As already announced, a remarkable archæological discovery has just been made in German Altenburg, a small town between Vienna and Presburg, on the Danube. From further details now published it appears that Professor Hauser under whose direction the Carnuntum excavations are carried on, ever on the alert, had for a month past observed the color of an extensive corn-field, which varied in every part. He found an elevated post of observation, and, after a week's close attention, declared it to be his opinion that the corn-field was growing over the site of an ancient amphitheatre. His drawings showed that the oblong centre piece was somewhat concave, and the corn was quite ripe in that part, because there was so much soil between the surface and the bottom of the theatre. Elliptical lines of green, growing paler the higher they rose, showed the seats, and lines forming a radius from the centre showed the walls supporting the elliptical rows of seats. The Professor waited impatiently for the corn to ripen, and the moment it was cut the excavations began. They have shown that the almost incredible suggestion was perfectly correct. Six inches below the soil the top of the outer wall was found, and from there the soil gradually grew thicker until the bottom of the arena was reached, the pavement of which is in perfect condition. From the theatre a paved road leads to the Camp of Carnuntum. As soon as the theatre has been entirely freed of soil covering it, all the measurements will be taken, and it will be ascertained what arena it is. — *London Times.*

ITALIAN CITIES.[1] — IV.

MILAN. — II.



Monument at Milan to those who fell at Mentana. Belli, Sculptor.

If there are anywhere in the world any religious structures which are larger than Milan Cathedral, it is nevertheless the largest among those built of marble. The first stone was laid in 1386 by Jean Galeas Visconti, who, having poisoned his uncle Barnabas, believed, according to the opinion of the times, that by this work of piety he would gain divine forgiveness. Many religious foundations of these days had no other origin. The name of the architect who made the design is not definitely known. Commonly a German artist, Heinrich Arles of Gmünd, is credited with it; but this story is usually contradicted by the Italians. There was at that time at Coma, near Milan, a school of masons and architects who played an important rôle in the architectural history of Italy, and who were employed on all important constructions from one end of the peninsula to the other. On the register of those concerned in the construction of the cathedral are the names of many of the members of this school, which allows us to suppose that the building is the fruit of a collective collaboration. Many foreign artists of great renown were also called from time to time to give advice and counsel, and among them figured with some prominence Nicolas Bonaventure and Mignot, Frenchmen, toward the end of the 14th century, and some architects of Freiburg. But the Italian artists always carried on a smothered warfare against these foreigners, and forced them to withdraw. In 1486, the Duke Sforza, the successor of the Visconti, demanded that the magistrates of Strasbourg should send him the architects of their cathedral, that they might solve certain difficulties of construction which retarded the completion of this building. This variety of collaboration had naturally enough as a consequence the debasing of the style of the monument and destruction of the unity of the design, without which there can be no perfect work of architecture. Each one wished to correct and modify and undo that which his predecessor had done, and this interrupted succession of workers has completely destroyed the purity of the original conception. It was, nevertheless, an Italian artist who gave the finishing touch to the monument, born under an evil star. In 1560 Cardinal Borromeo intrusted the direction of the works to Pellegrino Tibaldi, an artist of the post-Michael-Angelesque school. This artist was educated in the principles of the Decadence, and finished by giving to the monument that *baroque* air which prevents it from figuring amongst the monuments of the best school. Tibaldi held the Gothic style in horror as a foreign importation, and earnestly set himself about disfiguring the edifice and destroying so far as possible, every trace of its origin. He could not destroy the general ordonance of the design, but he introduced changes enough to make the incongruity visible. It was he, for instance, who opened the five doorways in the façade, instead of leaving them three as consecrated by long usage, and who decorated the windows in so inharmonious a manner. Thanks to his efforts the cathedral in some ways looks more like a building of the Renaissance than a monument of Gothic times.

Napoleon I, when he arrived in Italy, also wished to take a hand in the matter, since the façade was not yet finished. In eight years it was entirely finished, but we recognize to-day that it disfigures the monument instead of completing it. The Italian Government has

[1] Continued from No. 661, page 92.

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lately held a competition, since people wished that this Gothic building should have a Gothic façade, and it is to be hoped that the selected architects will know how to repair the injuries which their ancestors did to this fine monument.

The interior of the cathedral is in greater harmony. Here the original design has been better respected. The five naves covered by Gothic vaults are separated by 52 octagonal columns 25 metres and 39 centimetres high. The capitals, elongated drums in form, are conceived in a bizarre taste, but they are not wanting in majesty; and the windows which form the end of the apse allow entrance to the interior of rays of light, mitigated and softened, which do no harm to the religious character of the place. On the left on entering are the baptismal fonts. They say that the porphyry basin which contains the holy water formerly belonged to the baths of Maximian Hercules. According to the Ambrosian rite, which is followed in the diocese of Milan, baptism is made here by immersion, as was practised everywhere before the decisions of the Council, which arranged things differently. The Ambrosian rite, which dates from Barnabas, a disciple of St. Paul, was definitely regulated by St. Ambrose, who governed Milan at the time of Theodosius the Great. The essential difference between it and the Roman rite consists mainly in baptism by immersion, in the details of the liturgy, and in the manner in which are celebrated the holy mysteries, besides the prolongation of the carnival up to the first Sunday of Lent.

On the right in the transept can be observed the tomb of Giacomo de' Medici, the design of which is attributed to Michael Angelo. Not far from there the visitor's eye is caught by the statue of the half-flayed St. Bartholomew. It is an anatomical study rendered with such brutality of chisel that it would be more in place at the entrance of a clinical lecture-room or in the court-yard of the shambles than under the vaults of a church. The author had the ingenuousness to engrave on the pedestal the following inscription: "*Non me Praxiteles sed Marcus finxit Agrates.*" The statement seems rather superfluous, for it would never have occurred to anybody to attribute this statue of the amphitheatre to a celebrated Greek sculptor. A short distance from the sacristy are the stairways which lead to the tomb, where sleeps clothed in his pontifical robes, St. Charles Borromeo. Marvels of the goldsmith's art and the chisel of the sculptor have been combined to embellish this mausoleum; but aside from the richness of the decoration, it lacks every artistic value. The chapel alone has cost not less than 4,000,000 lira. The wood-carvings of the choir, as well as the designs of the windows in the apse, are the works of foreign artists, brought here at the end of the fourteenth century, and notably of Nicolas Bonaventure, Jean Mignot, and Jean Campanios, a Norman. This is the portion of the church where is to be found the simple and archaic character of the early times.

As I have already observed, the Cathedral of Milan cannot be rigorously considered a monument which indisputably belongs to the Gothic style, but it is none the less beautiful for that. After all, the purity of style which we ordinarily exact when we encounter works of architecture is the result of prejudice and pedantry, rather than of an exact conception of good taste. What we demand in an edifice is that it should please the eye, should realize an æsthetic conception of it, should incarnate in some form or other the beautiful and, especially, should faithfully respond to its intended use. A theatre should inspire mirth, awaken ideas of worldly recreation, and carry the mind of the spectator to a contemplation of fiction and poetry. A temple ought to awaken the sentiment of prayer and symbolize according to the spirit of the religion to which it belongs the aspiration of man toward God. In China, where religion is a very vague and very undecided manifestation of faith, and where the idea of God is found mingled with superstitious beliefs and philosophical traditions, religious architecture lacks every indication of a pious character. The pagoda, with its uniform type, is a public edifice whose beauty and richness can vary according to the locality, but which is not capable in its structure of revealing any religious idea whatever.

At Rome and in Greece, where paganism was only the humanization of faith cut up into many incarnations of which each was the manifestation of one of the forces of Nature, religious architecture had as many types as there were divinities on Olympus; and that explains to us why the religious buildings were so numerous and so varied. The Christian religion is the only one which has endeavored to put man *en rapport* with God through prayer. Elsewhere it is sometimes terror, sometimes bestial superstition, sometimes blind submission, which forms the base of the dogma. Here it is the necessity of constantly communicating with the Supreme Being of imbibing at the divine source every rule of life's conduct, and of remaining constantly in communication with the forces of truth which determines the exterior character of our religion. Thus, then, the church must especially express this need of approach,—this instinct of aspiring towards Heaven; and every race has expressed this architectural tendency according to its temperament. The people of the North, deprived of sun and flowers and of that splendor of nature which embellishes the South, have given to their temples a calm, severe and meditative physiognomy, from which the Gothic architecture has had its birth. The people of the South, more easily moved, more impulsive, habituated to satisfy their eyes with smiling and luminous landscapes, desired churches in which should be reflected the joyousness and radiance of the southern nature.

The exaggeration of these two tendencies has produced, as say the pedants who always assert purity of type in those monuments to which they accord their admiration, a manifest exaggeration in the artistic creations which have resulted from them. The Gothic is poor and mournful. It suggests to the mind funereal and despairing thoughts, and gives to religion a signification which it ought not to have, since it is composed, before all, of love and hope. The style of the Italian Renaissance on the other hand, which is the only one which can be contrasted with the Gothic, removes from Gothic architecture every severe and restful note. It accumulates too thoughtlessly all kinds of ornamental motives, and with a purely worldly intention of rejoicing the eyes and from a distance the imagination, it gives to the religious edifice a mundane aspect which does not answer precisely to its intention. One seems to be more conscious of the presence of God under the vaults of the Cathedral of Strasbourg than before the tombs of the apostles in St. Peter's at Rome.

In reality, when one judges a monument, he ought to listen attentively to the sensations which it awakens; to ask himself if these sensations are still in accord with the object to which this monument is dedicated; and when the pleasure which one experiences in beholding it is found to be not in contradiction to the sentiment which has compelled us to examine it, it may be admired without reservation and especially without asking one's self if the building can be accredited to any particular style.

I have attempted to state briefly these views, apropos of the Cathedral at Milan precisely because, as a usual thing, this building is accused of being not exactly Gothic nor quite Italian. It shall be whatever one wishes it to be. I will assert even, that it is one as well as the other; but that which it unquestionably is, it is, amongst the edifices of Southern Europe, perhaps the only one which translates with the greatest eloquence the irresistible movement which draws man towards God.

After the cathedral, the most interesting church which can be seen at Milan is that of St. Ambrogio. The personage who bears this name is one of the most important figures in the history of the Milanese. St. Ambrogio was born a Gaul, at Treves, about 340. He followed the calling of barrister; but when Probus, the pretorian prefect, destined him to the government of Liguria and Emilia, to which at that time the City of Milan was attached, in the course of a civil outbreak he showed himself animated by a lively interest in the well-being of the people, so that he was elected bishop by acclamation. He desired to decline because he was not yet a Christian, and up to that time had practised the religion of the Druids; but he was baptised and consecrated priest, and could then discharge those episcopal functions with which he had been invested. The democratic sentiments which had captivated the popular favor did not desert him after his elevation. He opposed an heroic resistance to the outrageous pretentions of the Empress Justine, who favored Aryan heresy. To satisfy the needs of the poor he caused to be sold the sacred vases, and refused to admit to the church the Emperor Theodosius, until he had done penance for the massacre with which he had soiled himself at Thessalonica in 394. He died three years after. He was in some sort the torch of the church, which, since the death of Lactantius had remained without light. The Milanese held him in great veneration, so much so that they are still styled Ambrosians. The church which to-day bears his name, and of which the first stone was laid in his episcopacy in 387, rears itself over the site of an ancient temple dedicated to Bacchus. It could be likened to a museum, because of the variety of inscriptions, busts, monuments, bas-reliefs, and other relics and historical curiosities which it contains. Since its foundation it has been rebuilt, remodeled, and altered, and finally the same Tibaldi, who did so much to alter the character of the cathedral, was also called in to complete the architecture of this church. Such as we see it to-day, it offers the perfect image of a vaulted Lombardic basilica, which hardly dates back farther than the twelfth century, for the bay of the nave, under which is placed the bishop's pulpit, fell for the last time in 1196. It is in this basilica that St. Ambrose repulsed the Emperor Theodosius, and it is here also that St. Augustine abjured his errors. The church is preceded by a vestibule of the ninth century, surrounded by a vaulted portico without ribs, the walls of which still bear traces of the inscriptions of the twelfth century and paintings of the same date. The temple is entered through three doorways, the middle one of which, of cypress wood, is magnificently carved, and is, according to many archæologists, a work of the eighth century. The interior is composed of three naves of Romanesque architecture. Over the meeting of the transepts with the apse rises a dome. The columns which support the naves are covered with stucco in imitation of marble. The dome is octagonal, with pendentives.

Under the grand nave may be noticed a porphyry column, bearing on its summit a bronze serpent, which came from Constantinople, and which, according to popular traditions, is nothing less than the famous brazen serpent which Moses showed to the people of Israel, and which must hiss at the end of the world. But the greatest artistic curiosity which this church contains is the golden *paliotto*, or retable of the altar, sculptured and enriched with precious stones, the work of Volvinio. It is the oldest piece of goldsmith's work known in Italy; and this monument proves that this admirable art, which Benvenuto Cellini was to carry in the sixteenth century to its highest degree of perfection, was then broadly known in Italy and had

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already made considerable progress at a time when the other plastic arts and the arts of drawing were still in their infancy.

The Church of St. Eustorgio is also one of the oldest. It was erected by the archbishop of this name on the occasion when he transported from Constantinople the three bodies which are considered to be those of the three Magi. The façade which we now see is modern, but the apse is older than the tenth century.

From the point of view of the history of modern art Santa Maria delle Grazie deserves special mention. The dome and the sacristy passed as being designed by Bramante, the compatriot, the friend, the protector of Raphael. We indeed recognize in this ingenious architecture, so gracious, so precious, so pretty, the style of that architect who was just then the master of the destinies of the Church of St. Peter at Rome, and who had all the qualities of an artist of the first order, except grandeur of conception. The great doorway which opens in the midst of the façade, is surely a chef-d'-œuvre of the Renaissance, and must even be considered one of the purest, finest, most irreproachable fragments which this epoch, so much discussed, so capable of being much discussed, has left to us.

It is in the old refectory of the convent that we go to look up the "Last Supper," by Leonardo da Vinci, that grand artist who had the enviable happiness of surpassing all his contemporaries and surviving almost all of his works, — of which he left us almost nothing. There were only a few Greek or Roman artists who enjoyed this kind of glory. The history of this mural painting is singular: Leonardo worked over it six years; sometimes he spent several consecutive days at his task; sometimes he remained whole weeks without adding a brush stroke. He mingled at night with the frequenters of taverns in order to discover a type for the face of Judas. It is not known whether the "Last Supper" was painted in oil or in fresco. Certain is it that the master prepared the surface after a process of his own, and it proved that his plastering was defective. Half a century later the painting was already dropping off in scales; and today we know the "Last Supper" only by the copies which were made before it was wholly destroyed. The neglect of the monks greatly hastened its ruin. In 1652 they cut off the legs of the Savior and his apostles for the sake of enlarging the door of the refectory. In 1726 they gave the *coup de grace* by intrusting the restoration to a certain Bellotti, who daubed it over to such a degree as to make it unrecognizable. He had the assurance to entirely repaint it, so that what we see today, in the place where was the chef-d'œuvre of Leonardo, is only the imitation of the restorers. In 1796 a French general turned the refectory into a stable and then into a hayloft. Finally, they attempted, but without result, a new restoration. The best copies are those of Marco D'Oggione, pupil of Leonardo, and the engraving by Morghen.

Milan possesses also a church in which we recognize the perfect type of the style of the Decadence. It is called Santa Maria presso San Celso, and it is attributed to Bramante, but I share the contrary opinion with Mongeri, who believes that it was designed by Dolcebono, one of Bramante's pupils. In truth, the general disposition of the motives, the excessive exuberance of ornament, the odd mixture of obelisks, torch-holders, statues, and particularly the device adopted of giving emphasis to the horizontal lines, perfectly characterize Dolcebono's manner. We can say that this church presents one of the most perfect models of architectural aberration which Italy fell into after the death of Bramante and Michael Angelo, for all the oddities of *baroque* taste are found united here, as can be judged from the design which we will lay before our readers.

Five kilometres from Milan lies the Chartreuse of Chiaravalle, so named because it was founded by the French monks from Clairvaux. The history of this foundation is quite curious. In 1134 the Abbot Bernard, whose reputation for great sanctity had already preceded him, arrived at Milan, having been called upon to put an end to a conflict which had arisen between the Milanese and Pope Innocent II. He was received and lodged with great honor in the Monastery of St. Lorenzo; and as the nobility of the city were exceedingly satisfied with the manner in which he discharged his delicate mission they besought him to found near the city an establishment regulated by the same laws which had already rendered the Abbey of Clairvaux prosperous and celebrated. St. Bernard yielded to their desires, and in a short ten years the colony of Chiaravalle had become the centre of the agricultural prosperity of all Lombardy. The abbey is very remarkable because of the purity of its Gothic style and for the grace and justness of its proportions. It contains within very remarkable paintings of the Lombard school, of which, we know, Leonardo da Vinci was the founder. Its clock-tower is a chef-d'œuvre of elegance and boldness, and rises with much vigor above the imposing mass of the church without crushing it and without diminishing its majesty — a thing which is always a very difficult problem for an architect to solve. It is octagonal in form to the height of the upper roof, which sustains the spire, and is composed of several rows of doors and windows arranged with a rich simplicity. The readers of the *American Architect* will remark that this tower is very similar to the type generally adopted by a great number of American architects.

It would not be possible to leave this review of the chief churches of Milan without mentioning San Lorenzo, which, according to tradition was a building erected by St. Ambrogio over the ruins of the Baths of Hercules. The plan of the building and the structure of its dependencies give much support to this tradition. The capitals, the sarcophagi and certain chapels all belong to the Roman epoch. The building, moreover, is a combination of several kinds of architecture. It is Roman in its columns, Byzantine in its dome, and Lombard in the square towers which rise upon its flanks; but its principal feature consists in the Roman colonade which borders the Corso di Porta Ticinese before a courtyard which lies before the church. These Corinthian columns still preserve, although damaged by a fire in 1071, that grandiose aspect which distinguishes from ordinary things the relics of the Roman period. They are more important here because Milan, in spite of the leading role which she formerly played in Roman administration, has only preserved very few remains of the period. We are told that these columns belonged formerly to the baths of Maximian. The name of the city also is found associated with the history of the most important act of the reign of Emperor Justinian, for it was at Milan that was published in the year 313, in the Church of St. Thecla the imperial edict which granted full liberty to practise all forms of religion.

[To be continued.]

THE ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

BUILDING OF THE HASTY-PUDDING CLUB, CAMBRIDGE, MASS. MESSRS. PEABODY & STEARNS, ARCHITECTS, BOSTON, MASS.

[Gelatine print, issued only with the Imperial Edition.]

ALTERATIONS TO HOUSE OF MESSRS. A. T. LYMAN AND M. B. INCHES, BOSTON, MASS. MESSRS. HARTWELL & RICHARDSON, ARCHITECTS, BOSTON, MASS.

THE houses Nos. 39 and 40 Beacon street as originally built were three stories in height with pitched roof, and cornice carved in solid wood. The porches and door and window trimmings were of white marble, the body of the walls of brick. Another story of rooms has been added, the cornice, which was very much decayed, removed and replaced in marble, which material was also used in the decoration of the additional story. At the same time, house No. 39 was thoroughly remodelled internally, a wing in the rear rebuilt, and in place of the picture-gallery which it originally contained, a ball-room has been made. This is richly decorated with woodwork delicately carved and with silk hangings upon the walls.

VIEWS IN MILAN, ITALY. — THE CATHEDRAL: THE ARENA: S. MARIA DELLE GRAZIE: THE ROMAN COLONNADE.

SEE article on Milan elsewhere in this issue.

HOUSE OF J. W. JENKINS, JR., AT "WINDY GATES." MR. C. E. CASSELL, ARCHITECT, BALTIMORE, MD.

HOUSE OF W. H. WRAY, ESQ. MR. E. G. W. DIETRICH, ARCHITECT, NEW YORK, N. Y.

ANCIENT AND MODERN LIGHT-HOUSES.[1] — XXIII.

LIGHT-HOUSE ADMINISTRATION.

TO select the proper sites for light-houses, to plan and erect them on difficult sites, to devise suitable optical apparatus, illuminants and lamps, to appoint proper keepers, to furnish the supplies, and to attend to all the minutiæ consequent upon a service

[1] Continued from page 65, No. 659.

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whose stations are scattered along a coast and are frequently difficult and dangerous of access, requires a combination of qualities seldom found in one individual. Therefore, in the more important maritime nations the control of the light-house system is vested in Boards whose members are as a rule selected with a view to their ability in the various lines indicated above, and whose orders are carried into effect by district officers.

FRANCE.

The Light-House Board of France, known as the *Commission des Phares*, has its office in Paris, on the hill Trocadéro, overlooking the Seine and Champ de Mars. This board consists of four engineers, two naval officers, one Member of the Institute, one inspector-general of marine engineers, and one hydrographic engineer.

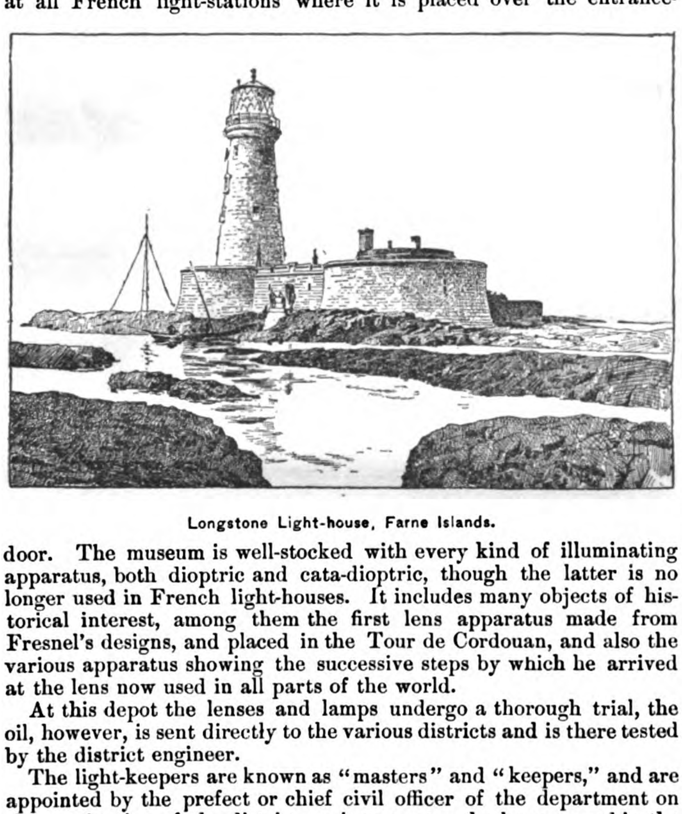
The executive officers are the Inspector General of the Corps of Engineers *des Ponts et Chaussées*, who is Director of the French light-house administration, and another engineer of the same Corps, who is Engineer-in-Chief and Secretary to the Commission.

The entire administration on the seaboard is entrusted to the engineers who in addition are charged with the work of river and harbor improvements.

The buildings of the Commission are placed around a rectangular court-yard in which are models of light-houses, buoys and other apparatus pertaining to the establishment. The principal building, containing the offices is a handsome structure two-stories high, built of brick and limestone in alternate courses. It is surmounted by a tower and first-order lantern, for experimental purposes.

The grand entrance-hall also contains many models, the most striking being those of the rock light-houses of France.

The council-chamber is richly decorated and upon its walls are painted two large charts, each occupying an entire side: one shows all the light-houses of the world, the other the light-houses of France, showing the illuminated areas. A bust of Fresnel, the inventer of the dioptric system occupies a prominent position, not only here but at all French light-stations where it is placed over the entrance-



Longstone Light-house, Farne Islands.

door. The museum is well-stocked with every kind of illuminating apparatus, both dioptric and cata-dioptric, though the latter is no longer used in French light-houses. It includes many objects of historical interest, among them the first lens apparatus made from Fresnel's designs, and placed in the Tour de Cordouan, and also the various apparatus showing the successive steps by which he arrived at the lens now used in all parts of the world.

At this depot the lenses and lamps undergo a thorough trial, the oil, however, is sent directly to the various districts and is there tested by the district engineer.

The light-keepers are known as "masters" and "keepers," and are appointed by the prefect or chief civil officer of the department on the nomination of the district engineer; men who have served in the army or navy are given the preference. The following requisites are necessary: They must be Frenchmen, between twenty-one and forty years of age, free from all infirmities which would prevent an active daily life, they must present a certificate of good moral character, know how to read and write, and have an elementary knowledge of arithmetic.

In return for their services the following annual salaries are paid: master $200, principal or keepers of the first class $170, second class $155, third class $140, fourth class $125, fifth class $110, sixth class $95. There is also allowed to each master and keeper a certain amount of fuel, and those at isolated stations receive rations. These salaries are paid in monthly instalments subject to a deduction of five per cent, which is used for a fund for retiring pensions.

There are never less than three keepers at a first-order light, and two at lights of the second and third orders. Masters are charged with the supervision of the service of several lights, the title (*maître de phare*) can also be granted to those of the principal keepers (*chefs gardiens*) who have merited it by exceptional service. The masters and principal keepers have general charge and attend to the correspondence, the other keepers owe obedience to them, but have the right of appeal to the engineer.

Every year on the recommendation of the Engineer-in-Chief, a bonus not exceeding a months salary may be allowed by the prefect to the most meritorious keepers, the number receiving such bonus not to exceed one-fifth of the total number of keepers in the department. Masters and keepers may be punished or dismissed by the prefect on the report of the Engineer-in-Chief.

Each keeper is allowed one kitchen and two bedrooms for himself

Bressay Light-house, Shetland Islands.

and family; the kitchen and one bedroom is supplied with furniture by the Government; there is no regulation prohibiting the acceptance of gratuities from visitors, on the contrary it is rather expected.

ENGLAND.

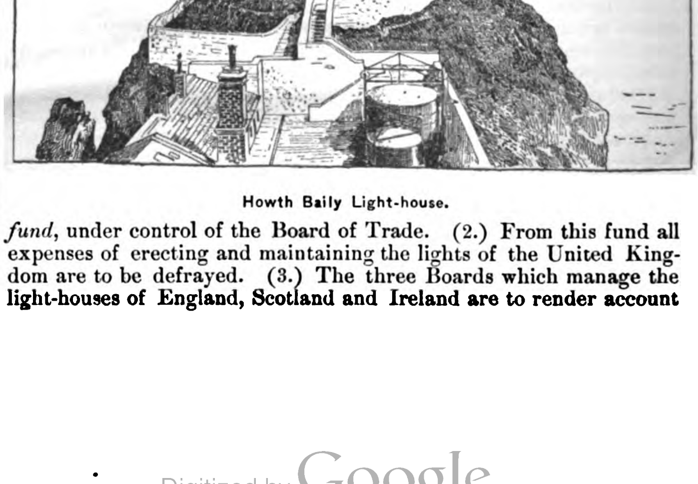
The Corporation of Trinity-House, or, according to the original charter, "The Master, Wardens, and Assistants of the Guild, Fraternity, or Brotherhood of the Most Glorious and Undivided Trinity, and of St. Clement, in the Parish of Deptford, Stroud, in the county of Kent," existed as early as the reign of Henry VII, (1485 to 1509), and was incorporated by royal charter during the reign of Henry VIII (1509 to 1547). In 1565 during the reign of Queen Elizabeth, the corporation was empowered by act of Parliament "to preserve ancient sea-marks, and to erect beacons, marks, and signs of the sea," but it was more than a century, *i. e.*, not until 1680, before the corporation constructed or owned any light-houses. After that date it from time to time purchased the lights which were owned by private individuals, or by the Crown, and erected new ones. In 1836, an act of Parliament vested in the Trinity-House the entire control of the light-houses of England and Wales, and gave it certain power over the Irish and Scotch lights.

Prior to the act of 1836 the charge was from one-sixth of a penny to one penny per ton on all ships at each time of passing a light-house, but by this act uniform light-dues of a half-penny per ton were established. The charge of one penny per ton at Bell Rock light-house is the only exception to this uniform rate. National ships, fishing-vessels and vessels in ballast are exempt from dues.

The English lights are placed under the corporation of the Trinity-House; the Scottish lights are under the management of the Commissioners of Northern Lights, and the Irish lights are under the care of the Corporation for Preserving and Improving the Port of Dublin, commonly called the Ballast Board.

The principal provisions of the act of 1853 affecting light-houses are as follows:

(1.) The light-dues of the United Kingdom are to form one *imperial*



Howth Baily Light-house.

fund, under control of the Board of Trade. (2.) From this fund all expenses of erecting and maintaining the lights of the United Kingdom are to be defrayed. (3.) The three Boards which manage the light-houses of England, Scotland and Ireland are to render account

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of their expenditure to the Board of Trade. (4.) The Trinity-House, or English Board, is to exercise a certain control over the Boards in Scotland and Ireland, and is to judge of all their proposals to erect new lights, or to change existing ones; but in every case the sanction of the Board of Trade must precede the acts of each of the three Boards.

This subordination to the Board of Trade causes much trouble and embarrassment.

The Elder Brethren of the Trinity-House, twenty-nine in number, comprise sixteen active members, including two officers of the Navy, and thirteen honorary members, all of whom are elected by the body as vacancies occur.

The honorary members include H. R. H., the Prince of Wales, some of the ministers to the Crown, several members of the nobility and of Parliament.

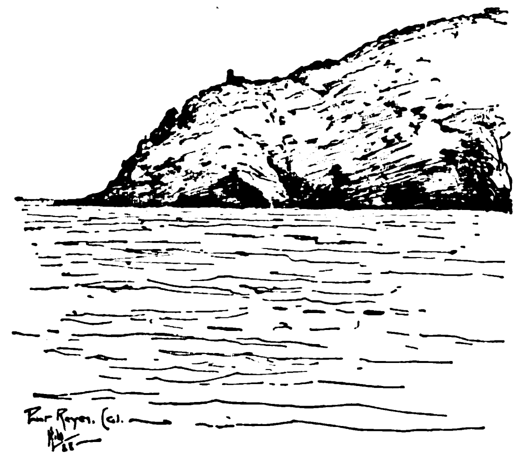
The Duke of Edinburgh is the present Master, but the Deputy-Master, who is elected by the Elder Brethren from their active list, is the executive officer.

The Corporation of the Trinity-House also includes the Junior Brethren, who are elected by the Elder Brethren, and have no duties, simply forming a reserve from which the Elder Brethren add to their number when vacancies occur.

Out of the annual revenues $1,725 are paid to each of the active members; these members are organized into committees which meet twice a week except when absent on duty. The entire Board holds weekly sessions, at which the matters previously considered in committee are disposed of.

Trinity-House is an ancient structure on Tower Hill, opposite the old Tower of London, in the "City;" it has a handsome freestone front in Classic style. The main entrance is on the ground floor through a capacious hall, where are exhibited models of many of the most famous light-houses in England, and also of beacons and buoys. There are ample accommodations for the officers, for the Board and Committees, for the Engineers' Department, and for photometric experiments, and in addition there is a grand banqueting-hall and *salon*.

The principal depot of the Trinity-House is at Blackwall, on the lower Thames; here are repaired the numerous light-ships employed on the coast above and below the mouth of the Thames. There is also a completely appointed lamp-shop. The grounds are limited in



extent and some of the buildings are old and inconvenient. Here is also stored a supply of buoys of all kinds.

There are two experimental towers fitted with second-order lenses for testing lamps, oils, effects of fog, etc.

There are other depots at Yarmouth, Coquet Island and other places, but the one at Blackwall is the principal depot for manufacture, supply and repair.

The immediate agents through whom the authority of the Trinity-House is exercised are called Superintendents, and each has some special duties assigned him, either the sole care of the service in some specified part of the coast or the charge of some special branch, such as the supply and storehouses at Blackwall. The tenders are under their orders; they wear a uniform on all occasions when on duty.

Light-keepers are appointed by the Corporation. The requirements are that they should be between nineteen and twenty-eight years of age, be of good moral character, be physically sound, and be able to read, write and perform the simpler operations of arithmetic. As vacancies occur successful applicants are taken on probation, *i. e.*, are appointed *supernumerary* light-keepers. They are then sent to the depot at Blackwall and placed under the orders of the Superintendent there. They are carefully trained in the use and care of lamps and all light-house apparatus, including meteorological instruments, the keeping of the light-house journal and accounts, and the general management of affairs at a light-house. A certificate of the lowest grade is given for competency in their duties. A second course of instruction includes the use of tools and plumbing, that he may be able to make minor repairs, and also the management and general knowledge of the steam-engine. A third course teaches the management of the magneto-electric machine and lamp, and the fourth course the use and management of fog-horn apparatus. Separate certificates are given for each course.

There are always eight of these candidates for light-keepers positions at Blackwall and two at South Foreland, the latter for instruction in the management of electric-lights, and to the great care taken in their selection and to the thoroughness of their instruction is to be attributed the excellent condition and efficiency of English light-houses.

The keepers and supernumeraries are supplied with neat uniforms; the supernumeraries are paid $225 per annum, and on receiving four certificates and giving satisfactory proofs of steadiness and sobriety they become entitled to an assistant-keeper's pay.

The rates of pay differ, depending upon whether the keepers are insured or not, as will be seen from the following table:

RATES OF PAY.

Grade of Keeper.	Gross rate per annum.	Deduct insurance.
Principals who have served as such above 10 years, if insured	$360.00	$15.00
Same if uninsured	350.00	
Principals, above 5 and under 10 years, if insured	340.00	15.00
Same if uninsured	332.00	
Principals under 5 years, if insured	330.00	15.00
Same if uninsured	322.00	
Assistant-keepers who have served as such above 10 years, if insured	290.00	15.00
Same if uninsured	282.00	
Assistant-keepers, above 5 and under 10 years, if insured	280.00	15.00
Same if uninsured	272.00	
Assistant-keepers under 5 years, if insured	270.00	15.00
Same if uninsured	262.00	

When no longer able to do service, keepers are pensioned, the pension being computed on an estimated allowance of $90 in addition to the above scale.

Flag-staffs are provided at each station, placed either on the tower or in the grounds surrounding it; from which is displayed the Trinity-House flag on Sundays, holidays and whenever the light-house tenders are seen approaching the station. At stations where there are detached dwellings, each keeper is furnished with a living-room, three bedrooms, a scullery, wash-room, a place for coal, and if the site permits, with a garden. A certain amount of standing furniture is provided. Small libraries are provided at each station for the use of the keepers and their families; these libraries are interchanged between the stations on the annual visits of the supply-vessels, medicine-chests are also supplied.

SPAIN.

In Spain the system of administration is the same as that of France. They form a part of the especial branch of public works and depend on a general board of direction established at the Department of Public Works. To this board is attached a permanent commission, composed of engineers of high rank, of the Corps of Roads, Canals and Ports, and of officers of the Royal Navy of like rank, who are always consulted when it is intended to modify or vary the general plan of lighting, or to establish some new light in which the site of the light-house, its height above the sea and its distinctive characteristic. In all else the construction, establishment and repair of light-houses appertain to the engineers who are distributed in the provinces; they and their works are usually visited at stated periods by their immediate superiors who are also engineers with the title of Inspectors, and who form a superior class of the corps. Their duties, powers and responsibility to each other and to the Government are entirely analogous to those which are established in France.

With regard to the lights and beacons, the captains of ports are required to watch their effects and to report to the engineer, and also, if they think necessary, to the chiefs of the Marine Department, so as to secure the adoption of such improvements as may prove desirable.

A special tax is collected, the product of which is applied to lighting the coasts; but the revenue thus derived enters at once into the public treasury, and the liabilities for each year, whether for new works or for the maintenance, lighting and service in general, are met by drafts on the credits opened by the budget of the State.

DENMARK.

The light and buoy service of Denmark is placed under the superintendence of the Ministry of Marine, who decides directly upon everything concerning the personnel, the establishment of new lights, the alteration of old ones, and upon all matters relating to the development of the light and buoy system.

The necessary funds are obtained by appropriation of the Legislature, "The Council of the Realm." There are two kinds of expenditures, the first for ordinary expenses for the maintenance of existing lights, the second for the erection of new lights and for works of considerable magnitude.

There are two kinds of lights, Governmental and Communal: all "sea-lights" are in the first class, and are maintained by the Government. In the second class are small lights placed at the entrance to roadsteads or harbors, and maintained by the respective communities. The light-house inspectors are naval officers, and receive pay and allowances as such.

A first-order light has three keepers, second, third, fourth and

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fifth-order lights two keepers each, and sixth-order lights one keeper. The number of keepers is sometimes augmented when the light is situated on isolated points or uninhabited islands. At sixth-order lights, where the nature of the service does not prevent, the keeper is allowed to have other occupation in addition.

HOLLAND.

The management of the coast lights, buoys and beacons of Holland is solely in the hands of the Government, and rests with the Ministry for the Marine, under whom there is an inspector-general and seven inspectors for as many districts, who are charged with the direction and superintendence of their branch of the service. The cost of construction and maintenance is placed yearly on the list of Government expenses.

The harbor lights being generally of only local importance are excluded from the care of the Government, being under the direction of the communities where they are situated. Plans and specifications for the construction of light-houses are furnished by the Government, and the work is let by contract to the highest bidder.

There are no general instructions for the district inspectors. The regulations conform to the local circumstances of each district.

In addition to the inspections by district inspectors, a general inspection is made by the inspector-general at times not stated.

Buoys and beacons are maintained by contract.

BELGIUM.

The construction of Belgian light-houses and harbor-lights is part of the general administration of roads and bridges (*Ponts et Chaussées*) under the superintendence of the Minister of Public Works. An annual sum is appropriated for repairs and maintenance.

The care of the light-houses is intrusted to the navy after they have been built by the engineers of the Ponts et Chaussées. The navy is under the control of the Minister for Foreign Affairs, and the "budget" includes each year the sum necessary for supplies and salaries.

The light-houses on the coast of the North Sea are under the authority of the Inspector of Pilotage at Ostend.

The inspectors of pilotage see that the lights are lit at the proper hours, and are kept in an efficient condition. The keepers, watchmen, etc., are under the orders of these inspectors who have the right to suspend them for five days; heavier punishments are inflicted by the General Director of the navy, which can only be remitted by the Minister.

Light-house apparatus is purchased by the Department of Public Works from those makers who seem to offer the best guaranty.

The Departments of Foreign Affairs and of Public Works consult together concerning any proposed changes in the lighting of the coasts.

AUSTRIA.

The superintendence of all the Austrian light-houses, buoys and beacons belongs to the Imperial Royal Admiralty.

The deputies of the Exchange at Trieste attend to the management of light-houses and instruct their inferiors. The duties of these deputies include the erection of light-houses, repairs, salaries of keepers and their discipline; they also collect light-house taxes and appoint the keepers.

All taxes levied on commercial vessels belong to the Treasury of the deputation of the Imperial Exchange Commission, in order to pay for the lights and all necessary expenses, repairs and renovations.

Every renovation or alteration of a light is first submitted for approval to the Admiralty by the Commission of Exchange, and the necessity for a new light is investigated by a commission.

(To be continued.)

MEDIÆVAL HOUSES.[1]—III.

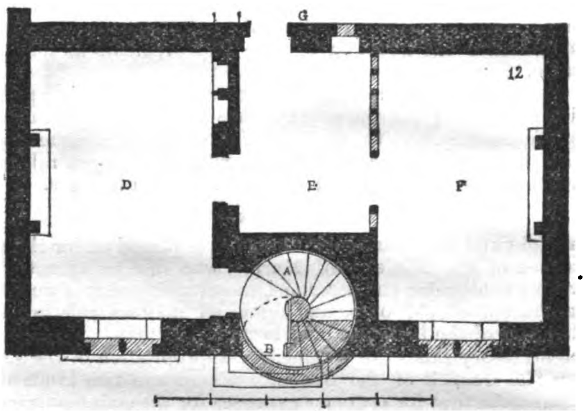

Fig. 12.

THE influence of the different schools of art of the provinces was as strongly felt in these dwellings as in the churches and public buildings. A house of Bourgogne is not quite the same as a house of Aquitaine, of the Isle de France, or of Normandy.

[1] Translated from the French of Viollet-le-Duc, by Mr. A. B. Bibb. Continued from page 309, No. 653.

The special peculiarity of the Burgundian house, found nowhere else, was the spiral staircase built upon the street front, and making a vestibule for the ground floor.

At Avallon, at Flavigny, in the little town of Semur in Auxois, and even at Dijon, there are still to be seen the remains of houses planned as shown in Figure 12. In the middle of the front is the staircase, *A*, corbelling out above the entrance-door, *B*; to the left or right, according to the enclosure of the staircase, is the door, *C*, opening into the first room, *D*, which communicates with *E* and *F*, the plan being the same on each floor. From the middle room *E*, which is an ante-room separating the salons *E* and *F*, there is an exit to the court or garden. An elevation of the street-front is given in Figure 13.

The entrance-door *B*, is sheltered by the overhang of the staircase, whose outer wall is carried on the ends of the steps which

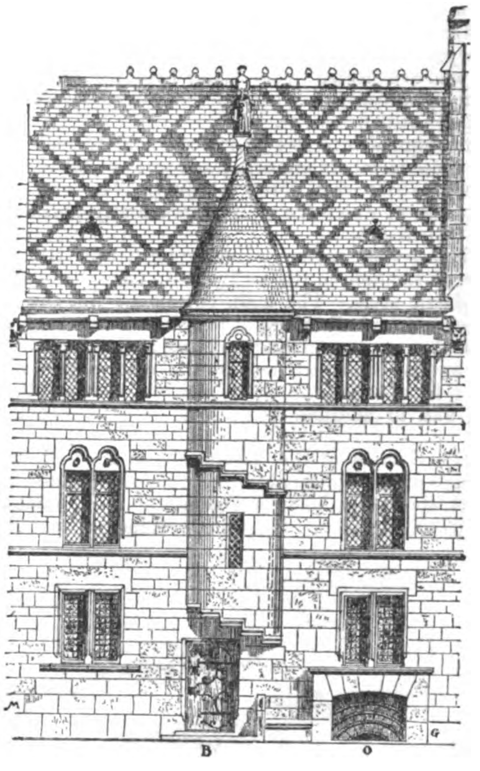

Fig. 13.

form corbelling upon the front: the entrance to the cellar, *O*, is practically under the sill of one of the windows on the ground-floor. The cellars in Burgundy, have always been an important feature.

The plan of this house was simple, economical and roomy. On the first and second floors *E*, was an ante-room between the salons *D* and *F*.

Burgundy furnished a very excellent hard stone strong enough to

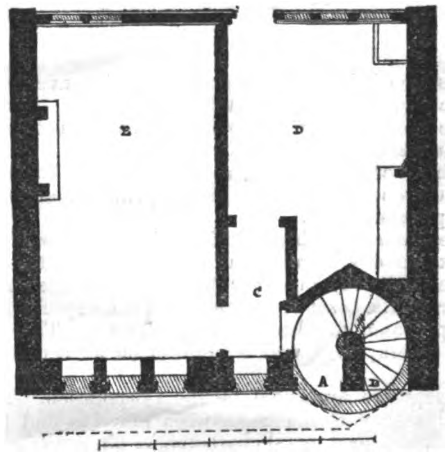

Fig. 14.

carry the small stair-tower, built in a curious manner on the outer end of the steps of the first turn.

The dwelling of this epoch in each province had a certain general plan common to all and adapted to the social requirements of the time, but, in the details, such as the shape and position of the openings, and that sort of thing, there was great variety.

The period was distinguished for great individuality of thought; every one consulted his own tastes or his personal wants in preference

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to merely imitating his neighbor. No municipality had then conceived the idea of imposing on all the proprietors in the same street a uniform style of architecture. In those times of reputed great oppression, no authority had yet tried to mould the dwellings of a thousand citizens after a common type. Each man's consciousness of his own individuality and personal responsibility was too great for him to suppose, for an instant, that men would allow themselves to be enclosed, like animals in a zoological garden, in barracks of a uniform style, designed only to please the eye of the sightseer.

Stone gutters inclining toward two different gargoyles and carried on projecting brackets appear in the elevation, Figure 13. This arrangement is still common in Burgundy and in upper Champagne, where long and durable stones for the gutters may be had. Elsewhere hollow beams, or planks covered with lead, are used. From the middle of the thirteenth century, in Burgundy and in Champagne, water from the roof was discharged through projecting gargoyles.

Several charming houses of the thirteenth and fourteenth centuries, standing at Vitteaux (Côte-D'or) some years ago, have been almost all demolished or altered. One of them, dating from the second half of the thirteenth century, shows in plan the following arrangement on the ground floor (Fig. 14): At *A*, under the enclosure of the staircase is the entrance-door, as in the preceding example. The door of the cellar opens on the street at *B*. The entrance-door opens into the little vestibule *C*, from which one passes straight on to the kitchen *D*, or, turning to the left, enters the salon. The plan is repeated on the first floor and gives two chambers; while in the second, under the roof, is a large space divided in the middle of the building.

The elevation (Fig. 15) shows, at *A*, the entrance-door, and, at *B*, the door of the cellar. The stair-tower is no longer carried on the ends of the steps, but on a flat and well-proportioned stone band. At the top the stair-tower loses the cylindrical form and becomes hexagonal, doubtless to lessen the difficulties of covering the roof.

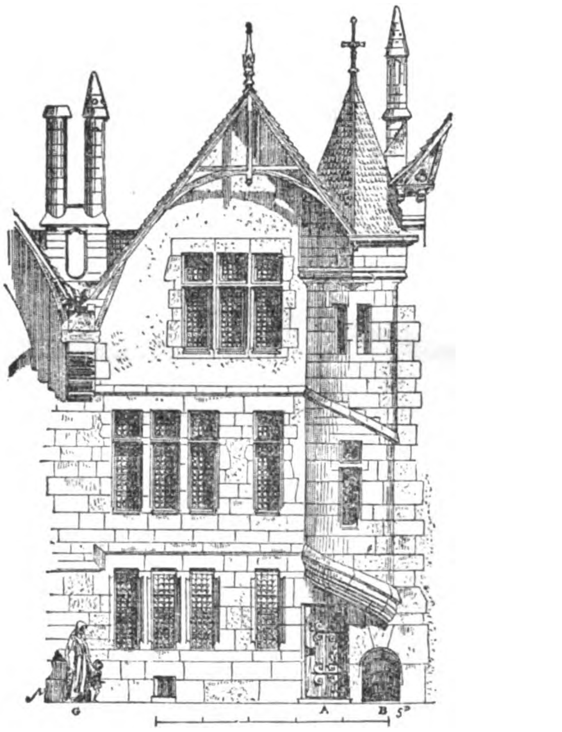

Fig. 15.

An interior court, or more often a little garden gives air and light to the kitchen and the back part of the salon.

The projection given by the corbelling of the stairs and a bracket, reinforced by an iron stirrup, support a heavy overhanging roof which shades the whole front. Water falling into the gutters is discharged at the left on the street by a wooden gargoyle, and on the right into the court through a wooden pipe, falling into a little stone reservoir at the corner of the kitchen. On the ground floor and the first story, the chimneys are on the side walls, their tops being visible in the elevation.

Thus in a space of about 100 metres, of which 49 metres were reserved for the building, the architects of Vitteaux succeeded in building a comfortable, healthy, well-lighted and sufficiently roomy dwelling, of moderate cost.

Only the front and side walls are of masonry, and the floors are carried on the two side walls and on the wooden partition in the centre.

A building of this character and style would cost, including the cellar, 250 francs to the square metre; or in all 12,250 francs, in the provinces.

The houses built to-day in the small towns of the Departments, cost more, are less healthy and commodious, and are remarkably ugly imitations of the large "bourgeois" houses of the cities.

There was no richness of ornamentation in these buildings, and they were generally entirely without carving previous to the fifteenth century; nor had they the vulgar symmetry so much prized by the modern magistracy. What pleases and charms us in these modest dwellings, is the impression of the satisfied wants and habits of the family which they sheltered; the sincerity of their construction, the forethought, skill and spirit with which the architect has profited by the various accidents of the given problem.

Were one of our modern cities to be buried in ashes, like Pompeii, it would be very difficult for the archæological discoverer, two thousand years hence, to get an idea of the tastes, manners and habits of the generation which had built them; if, on the contrary, we go into a fairly well-preserved house of the Middle Ages, everything speaks of the life of its former inhabitants, whom we find to have been people of distinctive character and varied tastes, with their own traditions and tendencies.

The hôtels of the lords, and the houses of the rich and influential commoners, were distinguished unmistakably from the dwellings of the commercial or manufacturing citizens. The latter built their fronts upon the street, while the houses of the nobles and great commoners were retired from public gaze behind blank walls.

The Marquise of Rambouillet has been credited with originating the plan of placing the house between the court and the garden.

Talleyrand des Reaux, who alone among the contemporaries of the Marquise, speaks of the pains she took in the building of her hotel, does not say a word of this invention of hers; and the hôtels built long before her time completely disprove it.

The hôtels of Saint Pol, Tournelles, Bourbon, Tremouille, Sens, Guise and of Cluny, at Paris, were, and still are, between the court and the garden. The houses of the commoners themselves differed in style according to the social status of their owners. The houses of the manufacturing, or mercantile towns of Beauvais, Amiens, Reims or Troyes were unlike those of towns inhabited by land-owners living on their rents, or by wine and grain merchants. The commoner's house in Rheims or Troyes opened on the ground-floor, and had a porch where the merchants chatted over business and other matters, whereas, in Provius or Laon, there was usually a solid wall on the street-front as high as the first floor.

[To be continued.]

COMMUNICATIONS

A CORRECTION.

PHILADELPHIA, PA., Sept. 3, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — We regret very much to see in our advertisement "Are You Aware" which appears in your issue of September 1st, that you have made a bad typographical error in the 6th and most important paragraph, wherein you show that our "Gilbertson's Old Method" IC 20 x 28 plates weigh only 220 lbs. when it should read 240 lbs. This is not a mere typographical error that can be passed over like some others, but it so happens that the whole force of the "ad" rests immediately in the figures referred to, and we would much rather the "ad" should *not* be read at all than read in this shape. In other words, as it stands, it does *us a positive injury*, and we write now to ask you that you call attention to this error in your next issue. Yours very truly, MERCHANT & CO.

THE EFFECT OF LEAD PLATES IN MASONRY.

WASHINGTON, September 4, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — On page 102 of your journal, just received, attention is called to the results and conclusions of tests by General Gillmore on the nature of the bearing-surfaces against the material (stone) tried for compressive strength. It will be of interest to compare with them similar observations of a commission engaged in the year 1855, in testing marbles for use in the extension of the United States Capitol, as communicated to the "American Association for the Advancement of Science," in a paper read by Professor Jos. Henry, Secretary of Smithsonian Institution:

"The specimens (cubes of 1½ inches in dimensions) were placed between two thick steel plates, and in order to insure an equality of pressure independent of any want of perfect parallelism and flatness on the two opposite surfaces, a thin plate of lead was interposed above and below between the stone and the plates of steel, as done by most experimenters in researches of this kind. Some doubt, however, was expressed as to the action of interposed lead, which induced a series of experiments to settle this question, when the remarkable fact was discovered that the yielding and approximately equable pressure of the lead caused the stone to give way at about half the pressure it would sustain without such an interposition. Cubes precisely similar to each other which withstood a pressure of 60,000 pounds and upwards when placed in immediate contact with the steel plates, gave way at about 30,000 with lead interposed. This

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interesting fact was verified in a series of experiments, embracing samples of nearly all the marbles under trial, and in no case did a single exception occur to vary the result. The explanation of this remarkable phenomenon is not difficult. The stone tends to give way by bulging out in the centre of each of its four perpendicular faces, and to form two pyramidal figures with their apices opposed to each other at the centre of the cube, and their bases against the steel plates.

"In the case where equable rigid pressure is employed, as in that of the thick steel plates, all parts must give way together. But in that of a *yielding* equable pressure, as in the case of interposed lead, the stone first gives way along the outer lines or those of least resistance, and the remaining pressure must be sustained by the central portions of the vertical axis of the cube."

After this important fact was clearly determined, "lead and all other interposed substances were discarded."

The commission who thus broke with the practice of Rondelet, Vicat, Rennie, etc., consisted of savans of whom this country may well be proud. Besides Henry, there were General Totten, Professor Bache, of the Coast Survey, and Captain Meigs. The writer of this served as assistant to arrange details, and devised a method for bringing the upper and lower surfaces of the cubes into perfect parallelism. The upper and lower surfaces of an iron frame were wrought into perfect parallelism by a planing-machine. A row of six specimens were fastened into this by a screw at the end, a small portion of the upper and lower parts were left projecting and ground down to a flat surface until the iron and the face of the cubes were thus brought into a continuous plane. Care was taken that the surfaces thus reduced to perfect parallelism were parallel to the natural bed of the stone, so as to preserve the actual exposure in properly laid cut stonework. The crushing forces recorded before that time were evidently all too low.

Professor Bauschinger, in charge of the mechanico-technical laboratory and testing-station for building-materials in Munich, has made the most exhaustive tests of the compressive strength of building-stones, in the years 1874–76, in which he has made use of the direct pressure of thick steel plates without interposed yielding surfaces.

Adolf Cluss.

Notes & Clippings

Concrete for Strasburg. — About 700 men are now constantly employed in the famous quarries of red sandstone near Saverne, where concrete is manufactured for the extensive new fortifications of Strasburg and Metz. The German experts regard this concrete as the best possible material for such work, and the French have adopted it since the success of the elaborate experiments at Chalons.—*London Truth.*

Pictures from the Tailor's Standpoint. — The organ of the London tailors, the *Drapers' Record*, has taken to art criticism from a tailor's point of view and has examined the pictures of the Royal Academy. The verdict is that but one or two artists have painted their sitters' clothes so that the material can be recognized. Burne Jones is the only one who receives unqualified praise. Poynter is complimented "in the name of the drapery trade," but in his portrait of the Earl of Harewood he has put "an outside breast-pocket on the right side of his Lordship's coat." Holl's picture of Earl Spencer in a coat with an Astrakhan lining is pronounced "a miserable failure. It looks more like moreen than fur." Another "very bad example" bears a nondescript "something" round the neck "supposed to be like sable." Another picture contains "shaggy-shoddy something unlike anything the critic has ever met with in the drapery world." As to "style, fit and fashioning," the report is decidedly unfavorable. For "the furnishing and upholstery departments," though, much approval is expressed. — *The London News.*

Shall St. Paul's remain a Religious Edifice. — Referring to an incident quoted in connection with Lord Carnavon's proposal to keep the churches open all day and every day, a correspondent of the London *Times* says: "It is in some respects, curiously like Sydney Smith's description of St. Paul's in 1837, the opening of which at other times than during Divine service he vehemently opposed I quote from a six-penny pamphlet, published by the Free and Open Church Association, of papers read at the Wakefield Church Congress of 1886 (p. 12), referring to a House of Commons Return as to the Free Admittance to Public Buildings (Febuary 6, 1838). "The Dean and Chapter claim an entire right of shutting the doors of the church after the services of the church are finished. All churches in England are shut when the service is over: and whoever wishes to see any church at any other period must find out the officer of the church and give him a fee for his trouble. There pass by the gates of St. Paul every day about 100,000 persons, and on days of more than ordinary excitement and bustle in the city more than double that number. If the doors of the church were constantly open, such numbers would come that all idea of performing the service would be entirely out of the question. It has happened in less than an hour between 2,000 and 3,000 people have entered the church, many of them of the lowest description, with their hats on, laughing, talking, eating, and making an uproar, totally incompatible with any idea of religion. . . . If the doors of St. Paul's were flung open, the church would become, as it has been in times past, a place of assignation for all the worst characters, male and female, in the metropolis; it would be a royal exchange for wickedness, as the other Royal Exchange is for commerce. Even now, with the restricted right of entrance, we see beggars, men with burdens, women knitting, parties eating luncheon, dogs, children playing, loud laughing and talking, and every kind of scene incompatible with the solemnity of worship. The mischief and indecorum which takes place at St. Paul's are very notorious; the Cathedral is constantly and shamefully polluted, and the prayer-books torn up; the monuments are scribbled all over, and often with the grossest indecency. The inference from these observations is that the right of entry must be restricted, or St. Paul's must be opened as a gallery of sculpture, and shut as a place of worship."

Trade Surveys

Two points are to be noted which have been silently working in the direction of an enlargement of our trade foundations. One is the vast expansion of our interior markets, the second is the crowded production that has been maintained in manufacturing establishments everywhere. The most careful observers of trade and trade movements who have recently returned from the far West and the South express the greatest surprise at the extent of the first cause referred to. New markets are springing up in fifteen or eighteen states at a surprising rate. When railroad building fell off the business world held up its hands in surprise. That stoppage amounted to but little. It permitted capital, enterprise and labor to rush in and fill up the field which railroad construction has opened. It has been doing this right along. The expenditures that have been made in these new sections of the country are merely preparatory to greater expenditures later on. Where twelve months ago there was one enterprise involving an outlay of $5,000 to $50,000, there are now two enterprises involving an outlay of great sums. For this reason the country is stronger. Its prospects are brighter, it has wider enterprises, to-day has more opportunity than twelve months ago, or at any time in history. Capital, also, has more opportunity. A good many journalists and so-called staticians and economists are making a great furore over the enormous indebtedness which new sections of the country have contracted and draw from this predictions of evil. The people of the West would not borrow unless they needed money. This idle money from the East is accomplishing miracles in the West. It is laying the foundation that will develop valuable markets for our manufactured products. Travelling-agents from our Eastern States who have been making careful tours of observation this season justify the statement that a vast market is being opened up for manufactured products in the new regions of country penetrated by the railroad construction of the past three years. Agents for lumber firms doing business in Chicago and Tennessee have recently furnished the information that the prospects for lumber in the Mississippi region are brighter than ever. What is wanted, they say, is that railroads should make cheaper freight rates, and in some cases quicker transportation. The lumber manufacturers in all sections of the country entertain very encouraging views as to the future. The requirements for all kinds of lumber are steadily increasing even in the East. There is no appearance of a glut in any department. New stumpage is being bought up. Valuable timber lands are being purchased along new projected roads. The value of standing timber has increased in a number of localities where railroads and water facilities offer continuous and cheap shipment. The lumber trade in general is in a good condition. There is a shortness in the supplies of logs in Southern rivers. Trade throughout the Northeast is reviving. The building industry is being actively prosecuted. Business in lumber in Minneapolis, St. Paul and Kansas City and the far South is heavy. Southern yellow-pine is crowding itself into all markets West and East. Northern capital has not been idle this season in picking up land in desirable tracts just as Pennsylvania iron capital has been interesting itself in Southern iron making. The only encouraging feature is the reaction of saw-mills and planing-mills, not only in the South but in the regions along the Northern border.

The manufacturers of saw-mill machinery have been only moderately busy this year, but recent reports state that the mill-capacity will be crowded with work from this out. The iron trade presents no new features. Throughout the Ohio and Mississippi Valleys there is great activity. East of the mountains trade is sluggish. There are no signs of increasing activity in railroad-building for this year. In financial circles in New York and Boston great railroad schemes are being nursed. It is the opinion of financiers in this section that a great deal of new work will be undertaken next spring. There will also be a great deal of small railroad-building to develop the territory by which profitable returns will be realized much quicker than is possible than with long lines where traffic alone is relied upon. In o her words, a great deal of railroad-building will be done in 1889 for the purpose of selling the territory developed. This will be the key-note to railroad-building for some years to come. There is a demand for agricultural land, and railroads will penetrate those sections. There is an urgent demand for mineral territory, and there are scores of enterprises now waiting which will be carried through for the purpose of selling the minerals which can be reached and sold. This spirit of enterprise is what controls all our railroad enterprises Hence it is that we hear of large land-purchases in the far off places. Railroad-builders intend to profit by the value which their enterprise will give to the surrounding land. The smaller industries are feeling the effects of September trade. Throughout the New England States there is very little dulness among manufacturers. Carriage-builders claim that they have had an exceptionally good season. Paper-makers point out a declining tendency in the prices of paper. Boot and shoe manufacturers are very busy, and feel that there is less trouble from competition in the struggle for trade. The cotton-goods manufacturers expect to put in a busy winter. The woolen and worsted interests are disheartened over the existing conditions and trade prospects. The electrical interests feel that they are now in a position where their inventions and improvements will be more promptly accepted by capitalists, and that work will be more abundant. The manufacturers of cast and wrought pipe have been picking up a good many o ders during August to supply material for water, gas and steam-using purposes. There is still a good deal of uneasiness among mill-men and transporters. Railroad managers are not satisfied with the freight rates, and mill-men are not satisfied with margins. The latter are maintaining very rigid rules in respect to credits. Both these great interests, however, recognize that the evolution going on will place our railroad interests on a firmer foundation, and that a demand for all kinds of products by another year will have extended to a point where the productive capacity of the country will be more steadily employed than it has been this year.

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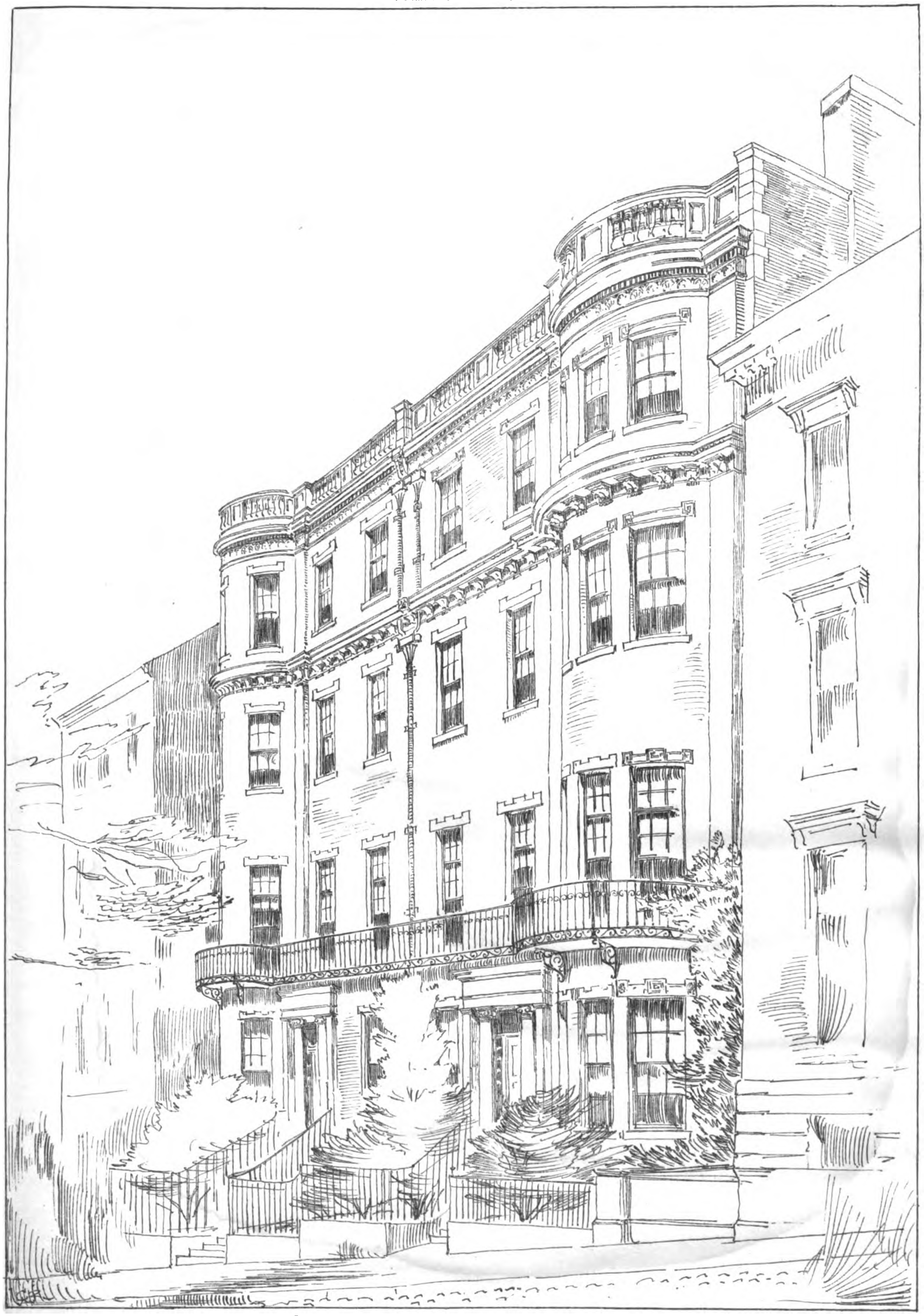

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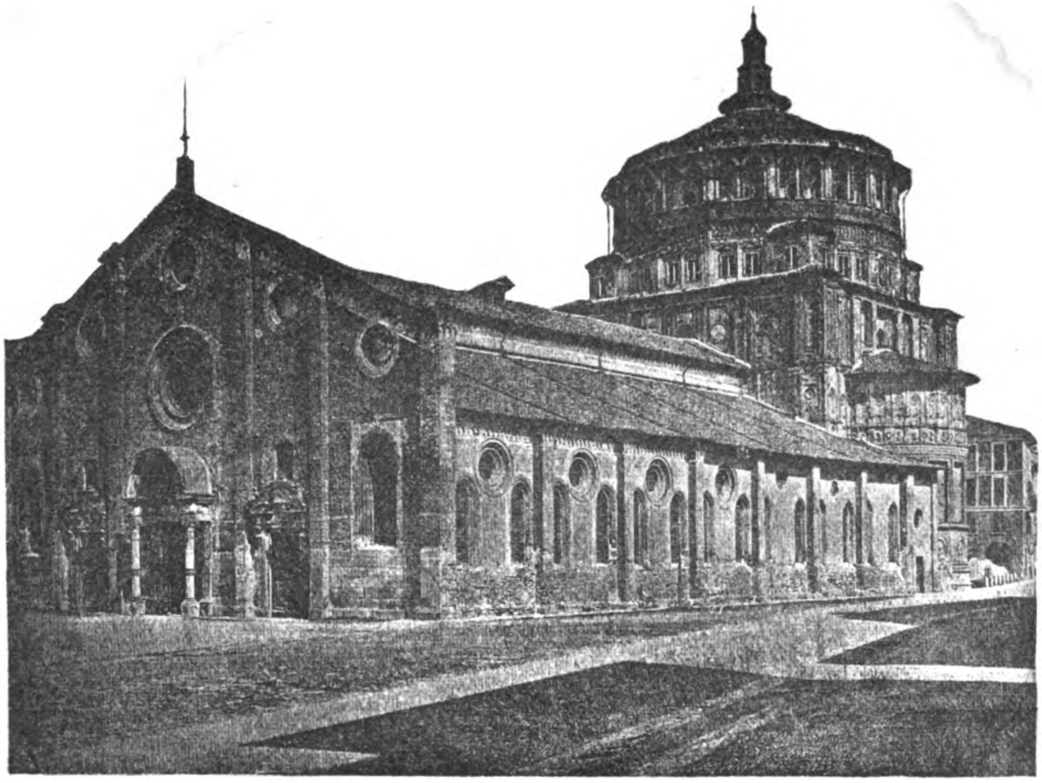

Church of S Maria delle Grazie
~ Milan ~

The Roman Colonnade at S Lorenzo
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The Cathedral. Milan.

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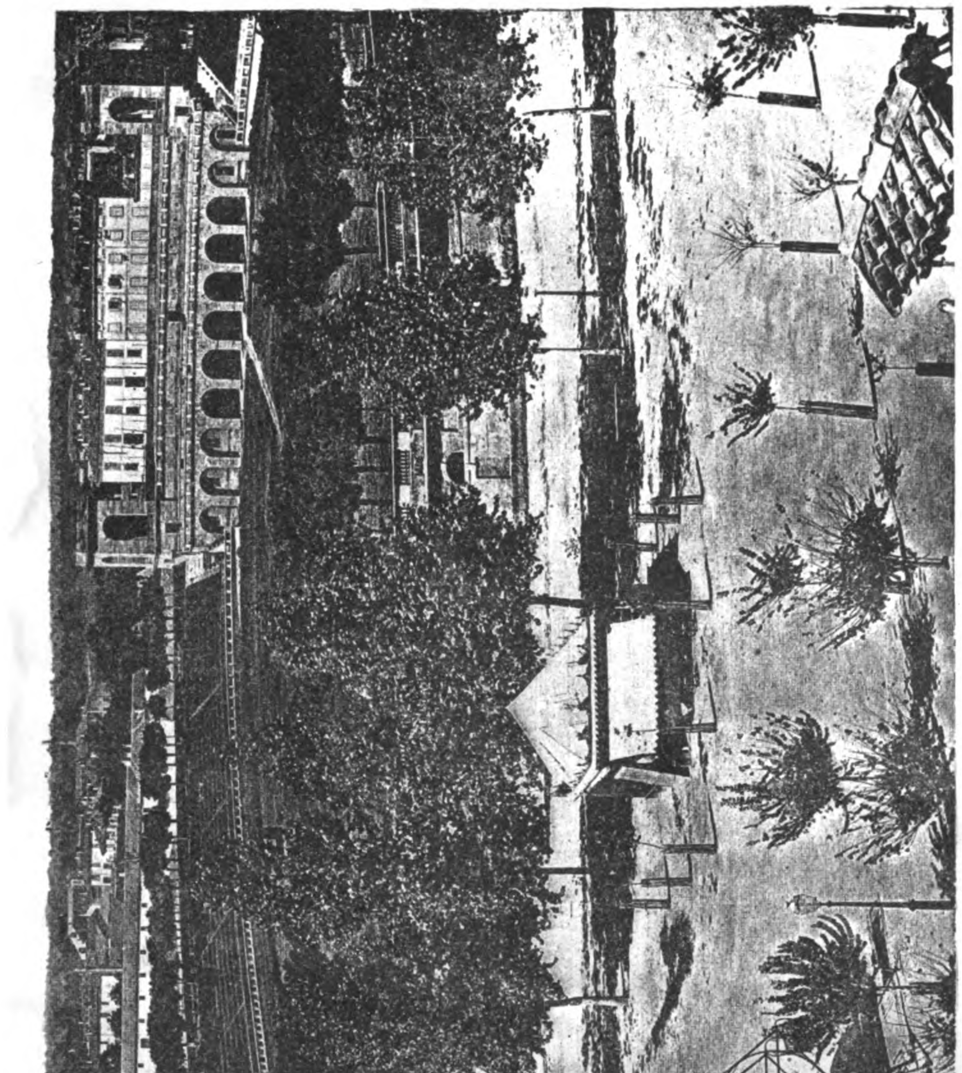

The Arena, Milan.

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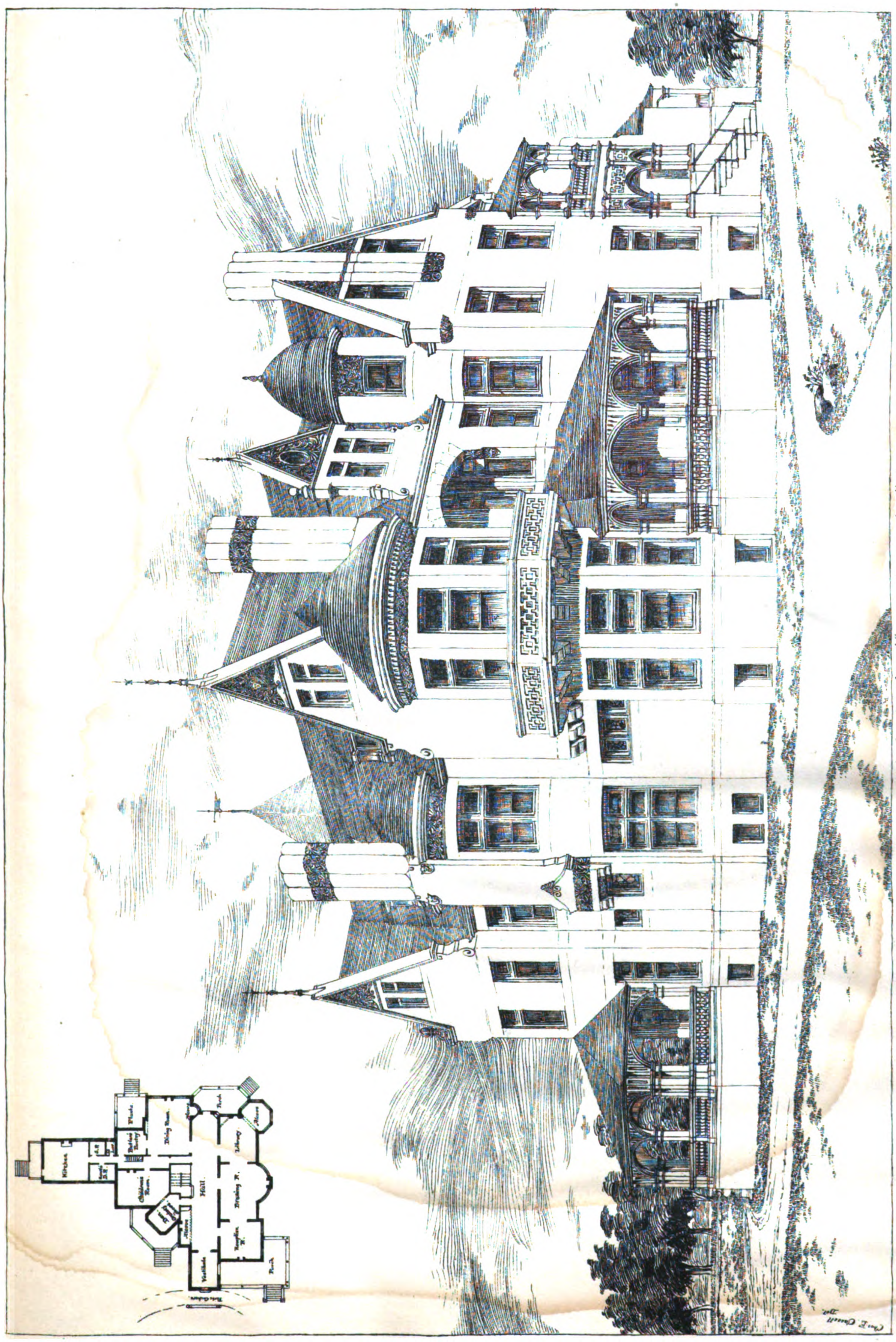

Residence designed to be built at "Windy Gates" for Jos. W. Jenkins Jr.
N. W. View.

Chas. L. Cassell, archt. Balt'o. Md.

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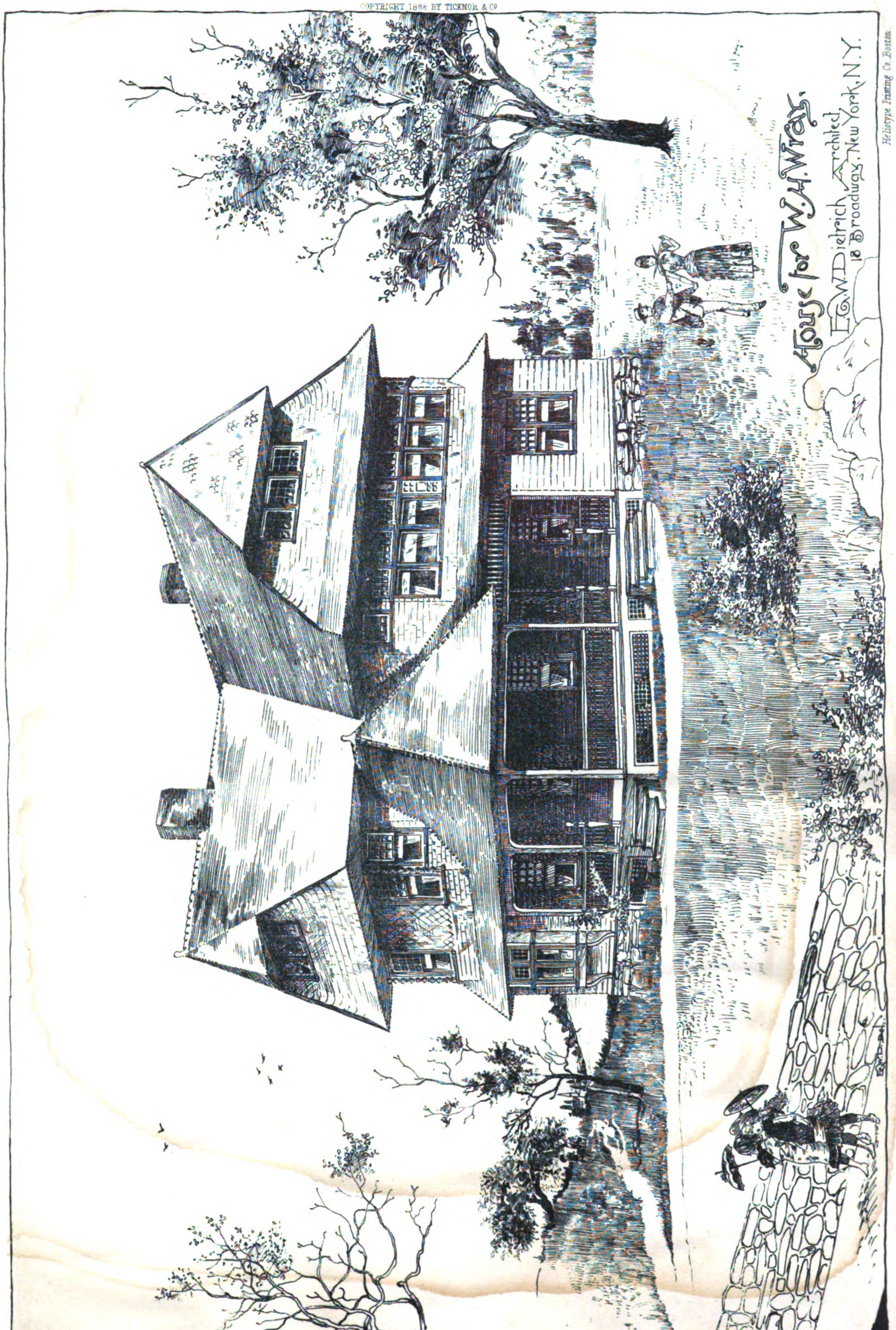

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THE AMERICAN ARCHITECT AND BUILDING NEWS

VOL. XXIV. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 664.

SEPTEMBER 15, 1888.

Entered at the Post-Office at Boston as second-class matter.

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THE removal of the vaulted ceiling of the Albany Assembly Chamber is nearly complete, and the sky is visible from the floor of the room between the timbers of the scaffolding. As usual, the daily papers testify their interest in the proceedings by all sorts of anecdotes, most of which appear to be apocryphal. One of these, in describing the way in which the great vault was built, represents Mr. Eidlitz as being much surprised to find, after the centres were removed, that the ribs were rising at the crown. "A youngster in his office" came to the rescue by pointing out that "the arches were wrongly loaded," and that this effect was inevitable. Hereupon, according to the veracious tale, Mr. Eidlitz protested that he "never heard of a groined vault rising at the crown," but he submitted meekly to the counsel of the "youngster," who produced "a book nearly a hundred years old," in which were given illustrations of arches afflicted with this tendency, and advised him that it would be best to check the aspirations of the key-stone by putting a weight on top of it; and the ceiling was accordingly loaded with iron. We hardly know whether to admire most in this picturesque narrative the figure of the distinguished German architect and engineer learning for the first time, after completing the widest groined vault in existence, that some arches were disposed to rise at the crown, or that of the patronizing "youngster," with his Rondelet under his arm, prescribing a load of pig-iron on the crown as a remedy for the deformation of a pair of arch ribs eighty-five feet in span.

ONE of the most important incidents of the removal of the ceiling is the destruction of the pictures painted by William M. Hunt on the tympana under the "formeret" arches of the vault. The pictures, which were painted on the bare stone, had lost much of their beauty, and one of them was almost entirely obliterated by the dampness coming from a leak in the roof, but many people will be sorry to lose even so much as is left of their fire and brilliancy, and several devices have been proposed for saving them. One of the least practicable schemes is that for sawing off a thin slice of stone, with the picture on it, which was proposed to some of the Vanderbilt family as a suitable enterprise for them to pay the cost of. It appeared, however, that in this case the picture would have to be repainted, and the sensible reply was returned that there could be no great advantage in saving a slice of stone, on which some one would have to paint Mr. Hunt's picture anew. A more promising plan is to remove the painted stones to another part of the room, where they will not be covered by the new ceiling, and reset them there, without retouching, and this may perhaps be done.

A CURIOUS statement comes from New York, to the effect that the insurance companies of that city have declared war on incendiaries, and propose to drive them into seclusion, where they can be kept out of mischief. The way in which this is to be done is, it appears, to identify persons who are in the habit of setting buildings on fire, and refuse to issue policies to them; and when an "incendiarist," to give him the polite name invented for him by the New York papers, moves into a new house or store, the companies propose to cancel at once all policies on property in the building belonging to other people. It seems that professional "incendiarists" like to hire lofts in stores or tenement-houses, and there carry out their schemes, and it is expected that the other occupants of a building in which one of these individuals may gain a lodgment, finding themselves in danger of being left without insurance, will help the underwriters to expel him. We should say that in any other community than New York the best way to get rid of a known incendiary would be to call a policeman, and have him marched off to jail, but metropolitan justice has certain peculiarities, among which may be a disposition to let incendiaries and underwriters fight out their disputes among themselves; and as, according to the newspaper accounts, there are many persons, both men and women, known to the insurance companies, who get policies on goods which do not exist, and set fire to the buildings in which they are supposed to be stored, the only weapon available against them appears to be some such system of boycotting as that proposed.

THE English papers announce the death of Mr. William Eassie, one of the pioneers in the modern movement for domestic sanitation. Mr. Eassie was born in Scotland in 1832, and was educated as an engineer. He was for a time assistant to Sir Isambard K. Brunel, perhaps the greatest engineer of the day, but, when still a young man, was sent to Russia with the late Dr. Parkes, to superintend the construction of the British military hospitals in the Crimea. On his return to England he devoted himself to what was then a new profession—that of sanitary engineering. It need hardly be said that the specimens of drainage work which he was called in to examine at that time would be considered barbarous now, but they served very well as a contrast to the improved systems which were even then beginning to be well understood among experts, and his book on "*Healthy Houses*," containing an explanation of the principles of modern house-drainage, with illustrations from his own practice, written in a clear and lively style, was so fortunate as to attract public attention in a remarkable degree. It passed through many editions, and was undoubtedly one of the principal agents in bringing about the sanitary reform which began fifteen or twenty years ago, and is still in progress. His subsequent book, on "*Sanitary Arrangements for Dwellings*," is little else than an abridgment of the "*Healthy Houses*." His energy and reputation did much to promote the establishment of the Sanitary Institute of Great Britain, and his extensive practice did not prevent him from writing frequently to the technical journals. He was lecturer on hygiene at the Charing Cross Hospital, and a member of many learned societies.

THE natural history, or rather, we should now say, the psychology and moral philosophy of microbes, seems to grow more interesting every day. It is not long since we heard of a sort of animalcule which had a deadly hatred for microbes, and would devour and destroy them in the system, and it now appears that this beneficent little creature is in a considerable degree a work of art, consisting, as we are told by *Public Health*, of "a little mass of bioplasm," which has been "educated" to resist the fell assaults of the bacterium. According to this authority, many, perhaps most, maladies "are produced by parasitism," the attack being simply the invasion of the harmonious community of organisms which composes the healthy body by a colony of hostile strangers. The invading colony, which may be the offspring of a single germ, finds its growth resisted by the healthy organisms naturally present, and a war follows. The strangers, according to this theory, have the property of secreting a soluble substance, which is poisonous to the native bioplasms. The latter, however, are brave and intelligent, and in fighting the invaders they learn how to resist the poison, so as to become in time almost

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unaffected by it. Where the piratical colony is small, and vigorously resisted by the natives, it is exterminated without coming to the perception of the individual whose body forms the scene of battle. If the invaders appear in greater force, the contest grows so serious that disturbance of the functions ensues, and the individual is then said to be suffering from an attack of the disease of which the invading microbes are characteristic. The gallant little home microbes fight hard, however, and gain by fighting strength and skill to resist; and unless the pirates show such force as to overpower the garrison, and extinguish the life of the patient, the natives, with every moment of successful resistance, gain in power, until they are able to drive out the strangers, and recovery takes place. More than this, the domestic microbes, now become veterans in fighting against that particular enemy, can easily repel an attack from a second colony of the same sort, and their owner is said to be "protected" against a recurrence of the disease. Even for years afterward, as *Public Health* says, although the original microbes have long since been replaced by new generations, the "descendants of the old heroes" retain an inherited prowess, which enables them to beat off all attacks of the same disorder. Although the power of the system to resist infection depends upon the training of the bioplasms which inhabit it to contend with the bacteria of that particular infection, this training need not always be given by struggles with the disease itself. On the contrary, by arranging a contest between the home forces and an army similar in character to that which we fear, but of less destructive power, our bioplastic heroes may be so well drilled in the tactics necessary for defeating this sort of enemy that a subsequent onslaught of more serious character will be repelled with certainty. This, we are told, is the philosophy of vaccination and inoculation with attenuated virus of all kinds, and as the microbes transmit their warlike accomplishments to their posterity, the theory seems to open an unexpectedly brilliant prospect of the ultimate abolition of infectious diseases. In fact, the homœopathic principle of *similia similibus curantur* seems to have been nothing else than an early statement of the same notion. The followers of Hahnemann claim that a drug which causes certain symptoms in a healthy person will cure similar symptoms in a sick person; now they may go farther, and explain that by administering small doses of a medicine which is known to cause certain derangements in the healthy body, they train by degrees in resistance to such influences a force of bacteria which, when it grows large enough, will drive out the hostile bioplasmic colony which has been causing similar derangements in the body of the patient.

A PIECE of reconstruction worthy of Chicago is now going on in Bremen. That city possessed, until last January, an Exchange, dating from the Middle Ages, and much frequented by the merchants. On the first day of the year it was burned. As it happened, the cellar of the building, after a common fashion in Germany, was occupied as a saloon, where beer and wine were dispensed to thirsty business-men. The vaulted ceiling of the cellar saved it from injury, to the great satisfaction of the merchants, who had a sentimental regard for the ancient room, and it was resolved to keep it intact. Unfortunately, the ceiling of the basement was considerably higher than the present street grade, and in rebuilding the Exchange it was considered of great importance to keep the first floor down nearly to the street-level. The merchants were easily convinced of the correctness of this view, but they could not make up their minds to lose their beer-cellar, so a compromise has now been agreed upon, by which the vaulted ceiling of the basement is to be removed, the earth excavated to a suitable depth below the present level of the floor, the walls and piers underpinned or rebuilt, and the vault reconstructed at a level enough lower to admit of entering the ground-floor directly from the street. At first sight this seems an extravagantly costly method of adjusting the matter, but it appears that in ten days before the place was closed for beginning the alteration ten thousand persons visited it, and the sales amounted to more than five thousand dollars; so the proprietor is probably justified in wishing to keep his location at any sacrifice.

THE celebrated antique marble quarries which were discovered some years ago in Tunis are now to be worked with the aid of the wire-saw, a device which would probably have amazed a Roman quarry-man. On the rediscovery of the quarries, after the opening of Tunis to civilization, a Belgian company gained control of them, and made preparations for working them at a great scale, but the business did not prosper as was expected, and the company has just been reorganized, and changes made in the methods of extracting the marble. For this purpose an extensive system of wires has been provided, driven by an engine of sixty horse-power, and affording facilities for sawing the stone in almost any part of the quarry. The wire is used in the form of a cord of three strands, twisted together. Each strand is a steel wire about one-sixteenth of an inch in diameter, and the twist makes a turn once in two inches. The cord runs over pulleys at each end, and is driven at a speed of about fifteen feet per second. The loops of endless cord are very long, and cross the quarry in various directions. At any spot where it is desired to use the wire for cutting, an iron frame is set up, having pulleys at the upper end, capable of adjustment in any direction, and two other pulleys below, attached to a bar which slides up and down on the frame, and is controlled by long screws. The wire cord is taken into this frame, and carried down over the lower pulleys, and, the frame being placed over a block of marble, or a fresh portion of the quarry, the moving wire is lowered, as it cuts its way into the stone, until the block is severed. Sand and water are fed automatically into the groove cut by the wire, and the sawing goes on, in hard marble, at the rate of six inches an hour. When used for cutting from the quarry, two holes are drilled in the stone, in which the upright pieces of the frame are set, and the wire cuts between them, down to the level of the bottom of the drill-holes. The wire-saw is found so effective that it is now used for cutting the larger blocks into the special shapes that may be ordered, and the quarry company supplies finished work as well as rough blocks. It is a pity that these beautiful marbles should not be better known here. The antique yellow, which is found in great masses in the quarry, is, to our mind, the most beautiful marble ever put into the market, and a pink shade is found which is said to be very pretty. There are various indications that the buildings of the next decade in this country will contain a good deal of marble and other colored stones, used in novel ways; and it is very desirable that the architect's palette of marble, so to speak, should be set with all the colors that can be procured.

THE English papers seem to contain an increasing number of notices of historical estates offered for sale, and one would imagine that the heirs of the great families had been seized with a panic, and were abandoning their ancestral property at any sacrifice. The most curious piece of real estate now in the market seems, according to the *Builder*, to be the Island of Foula, which lies in the Atlantic, thirty-five miles north of the Orkneys, and is generally supposed to be the "ultima Thule" of the ancients, — the extreme point of the world. The island itself it a mere rock, two and a half miles long by something more than a mile wide, but it is inhabited by nearly three hundred persons. The residence of the lord of the manor is known by the pretty name of "Liorafield," but, as the house contains only four rooms, the name appears to be the principal attraction. Another estate, which seems likely to furnish more comfort to the owner than "farthest Thule," is the Echt property, the ancestral home of the Lindsays, the Earls of Crawford. Eight hundred and fifty thousand dollars has been refused for the estate, but as the net rental of the farms is twenty thousand dollars a year, and the owner enjoys, besides, the use of a magnificent mansion, partly built by the late George Edmund Street, a private observatory, and four thousand acres of forest and moor for hunting, the property may be regarded as paying a tolerably good interest on the investment.

ONE of the useful practical suggestions of the *Wiener Bauindustriezeitung* is that an excellent paint for walls may be made by dissolving, with the aid of a moderate heat, one part of paraffine in two or three parts of heavy oil of creosote. The solution should be thick when cold, but not solid. In use, the can containing it should be set in warm water, so that the paint may be liquid, and flow freely from the brush, and the wall should not be too cold. For brick walls exposed to dampness, or liable to become soaked by driving rains, this forms a useful application, either on the inside or the outside.

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BUILDERS' HARDWARE.[1] — VI.

FRENCH–WINDOW BOLTS.

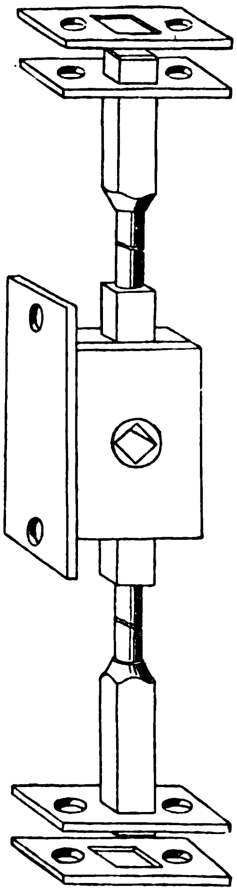

Fig. 49. Mortise French Window-bolt. J. B. Shannon & Sons.

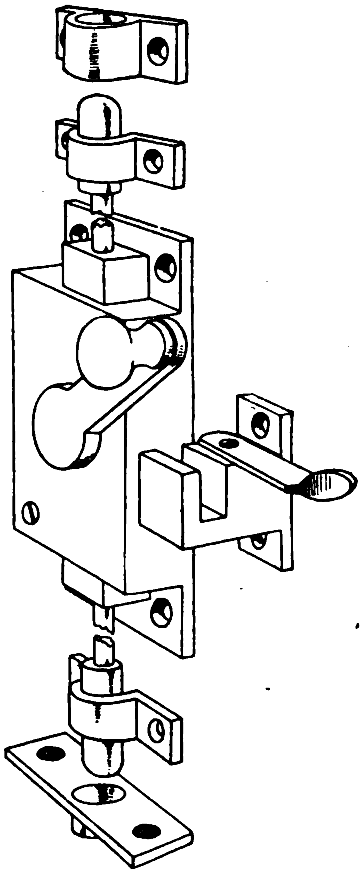

Fig. 50. French Window-bolt. Hopkins & Dickinson Manufacturing Co.

FRENCH-WINDOW bolts are usually mortised into the centre style of one of the sashes and are so arranged that a crank or handle on the face of the sash will throw a bolt in each direction, so as to lock the window at the top and the bottom. Figure 49 is a form operated by a knob and spindle. In setting it, the gearing-box or mechanism of the bolts can be let into the door in the same manner as an ordinary mortise-lock, and the two rods dropped in through a hole bored the length of the sash, the rods screwing into the hubs on the gearing-box. The retail price of this appliance is $4.00 in bronze, including a bronze handle. Figure 50 is another form, similar in its action as regards the bolts, but intended to plant on the face of the sash. The crank handle drops into a catch on the opposite sash, and can be locked by turning the bar on top of the catch. The retail price in bronze is $4.00.

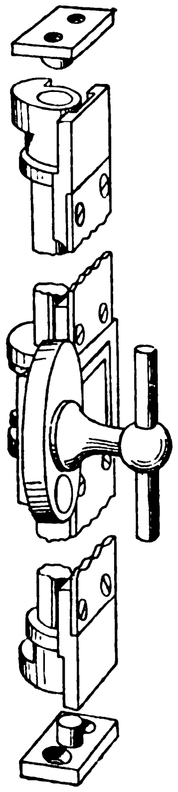

Fig. 51. Espagnolette-bolt. Hopkins & Dickinson Mfg. Co.

Espagnolette-bolts are arranged, like the foregoing, with the shoot up and down, but in addition the bolts are made to turn so as to hook onto a post or peg at the top and bottom. They are much used in France for double windows, and have several advantages, as they not only lock the sashes, but also draw them up firmly against the window-frame, thus making them more secure against the weather. Figure 51 illustrates one form of espagnolette-bolt.

There are many other devices adopted for securing French windows. In the cheapest class of work an ordinary cupboard-catch is used; and in the best work they are sometimes secured with a regular key lock.

[1] Continued from No. 663, page 109.

CHAIN–AND–CHECK BOLTS.

At one time it was considered quite essential that a front door should be provided with a chain door-fastener, which would permit the door to be opened a few inches to inspect any doubtful character on the outside, while it could be opened no farther. Figure 52 illustrates a typical form of chain door-fasteners consisting of a slotted plate to go on the face of the door, and a chain secured to the door jamb, with a dog on the end of the chain which will slide freely in the slot of the plate. A holder is provided to which the chain can be attached when not in use. There are many varieties of chain fasteners. They would average about $1.00 per set in cast brass, and $2.50 silver-plated. P. & F. Corbin manufacture a rim door-bolt which has a chain attachment, the dog of the chain working in a slot cut in the barrel or plate enclosing the bolt.

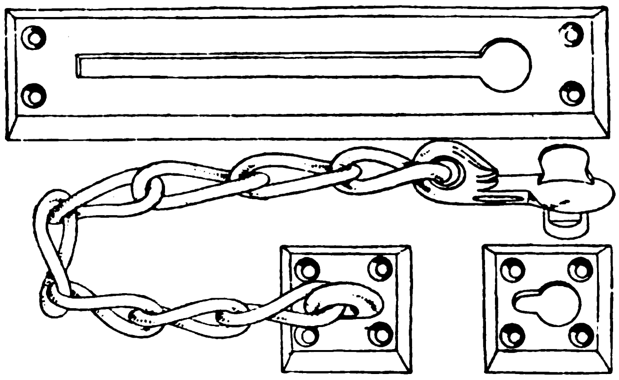

Fig. 52. Chain Door-fastener. P. & F. Corbin.

Instead of a chain, some form of hinged bar is often employed, the fixture then being designated as a check-bolt or door-fast. Figure 53 illustrates one form of door-fast (Nichols, Bellamy & Co., agents). The staple-shaped bar or rod works in a standard which is screwed to the door-jamb, and fits over a knob secured to the door. The door, on being opened forces the knob along between the prongs of the bar until it can go no farther, permitting the door to open only about four inches. When it is not desired to secure the door, the bar is turned back against the wall. When the bar is turned at right angles to the wall, or midway between these positions, the shoulders are brought directly over the knob on the door-catch, and the door is secured so that it cannot be opened at all. This fixture retails at $2.50, in bronze.

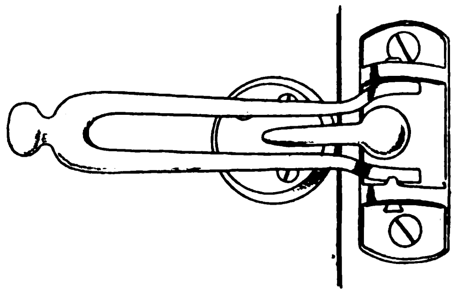

Fig. 53. French Door-fast. Nichols, Bellamy & Co.

Figure 54 is another form of door-fast consisting of a straight bolt working through a hinged socket attached to the door. The bolt has shoulders at the end which fit into the catch on the door-jamb in such a manner that when the door is opened and the bolt tilted the shoulders are held by the jamb-catch, the bolt slipping through the socket on the door. The retail price of this fixture, in bronze, is $2.00.

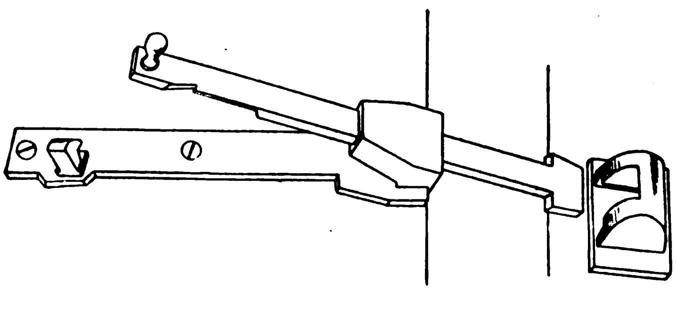

Fig. 54. Door-fast. Sargent & Co.

Figure 55 illustrates a form of door-check which combines some of the features of both of the foregoing fixtures, though

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taking up more space when applied. It retails at $1.00 in either nickle-plate or bronze.

MORTISED DOOR-BOLTS.

In addition to the ordinary lock on a door, it is sometimes found desirable to attach a plain bolt of some form, as an extra security. The form most commonly used is known as a mortise door-bolt, consisting simply of a barrel-bolt in a cylindrical case, which is mortised directly into the door-style and is operated by a spindle with turn-button or knob on the inner face of the door. In external appearance the various makes of mortised door-bolts are very much alike though some are finished so as to require no other mortising than can be done with an auger, while others require more hand work in the application.

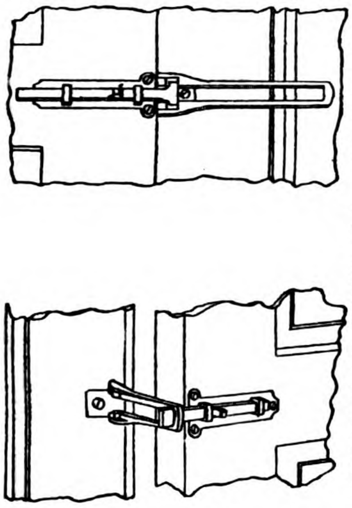

Fig. 55. Perkins's Door-check. Portsmouth Wrench Co.

Figure 56 illustrates a complete bolt, and also shows one form of internal arrangement. When the bolt is thrown, the shoulder on the follow, *B*, is turned so as to bring it very nearly on a line with the centre of rotation of the spindle, thus locking the bolt. The spring, *C*, tends to keep the shoulder from rising.

The simplest and most ingenious mortise door-bolt which has come to our attention is the one manufactured by Sargent & Greenleaf, designated as the "Gem mortise-bolt," Figure 57. It consists simply of a solid bolt completely filling the diameter of the bolt-case. The cogged spindle works over the teeth cut across the bolt. The last tooth towards the back of the bolt is smaller and projects less than the others, and the last cut is wider than the intermediate ones; so that when the bolt is thrown the cogged spindle wedges into the wide cut and locks the bolt, making it practically impossible to throw it back by external pressure. The beauty of this bolt is, there is nothing about it that can possibly get out of order, and the only effect of wear would be to make it work more efficiently, if possible. P. & F. Corbin, Russell & Erwin, the Stoddard Lock Manufacturing Co., and the Reading Hardware Co., manufacture door-bolts similar in the main to Figure 56. The following table gives the average retail prices:

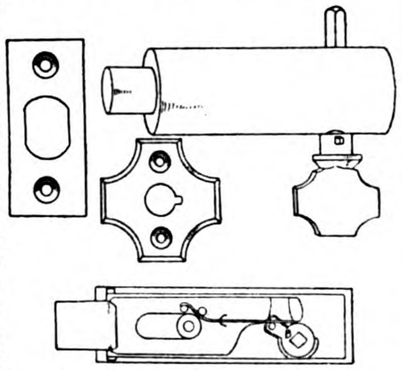

Fig. 56. Cylindrical Door-bolt. Ireland Mfg. Co.

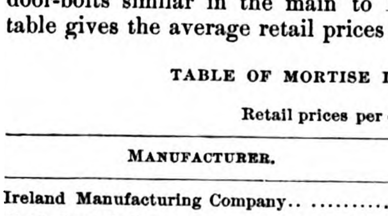

Fig. 57. Gem Mortise Door-bolt. Sargent & Greenleaf.

TABLE OF MORTISE DOOR-BOLTS.

Retail prices per dozen.

Manufacturer.	Plain Bronze.	Nickle-plated.
Ireland Manufacturing Company..........	$2.25	$2.62
H. B. Ives & Company......................	3.00	3.50
Sargent & Greenleaf........................	5.50	3.50
P. & F. Corbin................................	2.70	3.00
Russell & Erwin..............................	2.55	2.55
Stoddard Lock and Manufacturing Company	*6.00	*6.00
Reading Hardware Company..................	....	2.00

* List Prices.

[To be continued.]

ITALIAN CITIES.[1]—V.

MILAN.—III.

The Arch of the Simplon, Milan.

By a curious freak of fortune we can say that the most Classic of the monuments at Milan were erected at the commencement of this century. We know that on the morrow of the French Revolution there was through the whole Latin world a furious revival of classicism, a disentering of Greeceism pushed to the very verge of extravagance. People no longer swore but by Pallas and Vulcan, and women, habited in the *peplum*, desired that their offspring should be named Themistocles or Scipio, and that their daughters should be called nothing if not Julia and Xantipe — not particularly reassuring for their future husbands this.

Architecture also yielded to a similar mania, and at Milan, for instance, all buildings erected at this time bear the mark of this Classic renaissance. The arch of the Porta Ticienese is a striking example of this. It was to be erected to perpetuate the memory of the victory won by Napoleon I at Marengo in 1800, but while it was being erected, that hero was conquered and exiled to St. Helena, and the monument achieved another destination. It was dedicated, as the inscription says, "to Peace, the liberatrix of the people." Alas! monuments, like books, have also their destinies.

This arch, designed by the architect Luigi Canonica, is conceived in the purest Grecian style. It is composed of two pilasters and two columns of the Ionic order supporting an architrave, above which rises a pediment. The justness of the proportions makes the appearance agreeable, and when Milan is entered by the Porta Ticinese one might almost believe that he had entered a Grecian city, if it were not for the very modern garb of the inhabitants and the ultra-occidental appearance of the quarter. The finest arch which is to be seen at Milan is that of the Simplon, so-called because it is thrown over the road which leads from Milan to the Alps of the Simplon. It has quite an accidental origin: it was first built of wood in 1806, by order of the Municipality of Milan, when Prince Beauharnais, with his wife Amelia of Bavaria, ruled Lombardy as viceroy. The design of this improvised monument was found to be so satisfactory that it was decided to translate it into marble, but the decoration was intended to be something other than that which it now bears. In memory of the battle of Jena, it was decided that a Victory should be placed on the summit. Thorwaldsen had sculptured the triumph of Cæsar, and the deeds of Napoleon were to figure as bas-reliefs in the intercolumnation between the pilasters. But the disaster at Waterloo modified this plan. Instead of the glories of the Emperor, the bas-reliefs immortalize the fêtes of the restoration — another proof, alas, that monuments are subject to the caprices of destiny.

The statues which ornament the public places at Milan are very few in number, and all belong to modern times. The monument to Count Cavour and that to Alexander Manzoni are conspicuous for that difficulty which I have had occasion to insist on in the course of these studies on architectural Italy — I mean the inconvenience which the civil garb in our day opposes to the sculptor. Cavour was a statesman, and Manzoni was a romancer, a philosopher and poet. One represents politics, that is to say prose; the other, fiction, imagination, dreams, that is to say poetry; yet nevertheless the two statues are as like as two drops of water. What we see nowadays in the statue are a frock-coat and trousers; and, alas, all frock-coats look alike. Though the sculptor has tried to find a new pose, to model with great care the expression of his subject, to give it

[1] Continued from No. 663, page 111.

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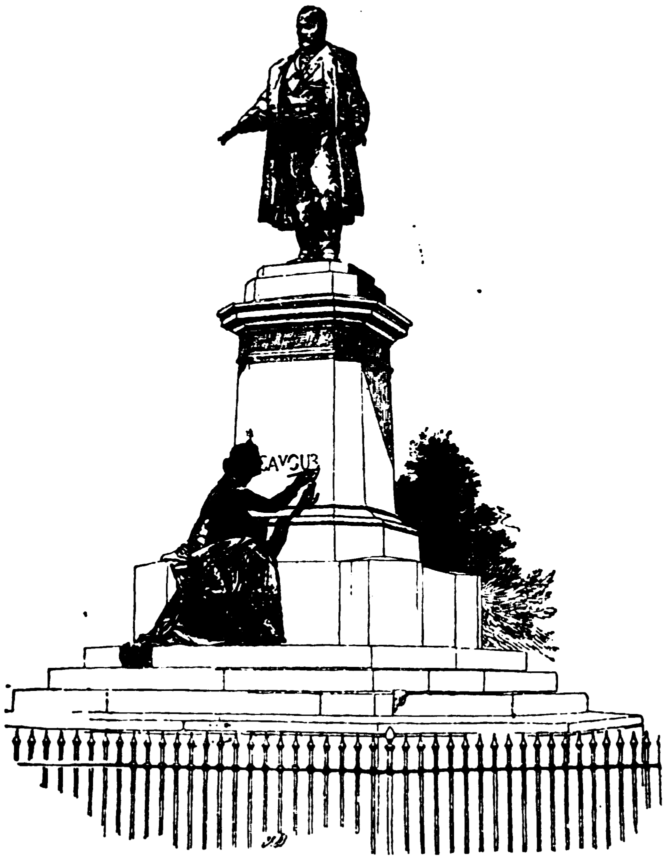
a fine physiognomy and to indue it with noble gestures, he will never succeed in lending to his work either nobility or originality. The sculptor who busies himself with modern subjects can find strong and distinguished expressions for those subjects only which furnish him a determinate manner of treating either the nude or the clothes. There is an example of this in the monument recently erected by the radical party to the Garibaldians at Mentana. Here the author conceived an allegorical work — Italy offering a crown to the martyrs to the national cause, and a personage richly draped, with shoulders bared, serves to give to the monument an air of dignity and force: about the pedestal is wrought in bas-relief military scenes relating to the Garibaldian epoch, and serving to explain the historical connection of the monument.

In religious sculpture the artist still finds sufficient resources. Great men of the Church have always worn a costume which lends itself to treatment by the brush or the chisel. The priestly robes give to the figure majesty and amplitude. An archbishop's statue, if it be well cut, can bear comparison with those of antiquity: that of Frederick Borromeo, which may be seen at Milan, forms a singular contrast with the bourgeois silhouette of Cavour and Manzoni. After St. Ambrose, Charles Borromeo is certainly the individual whom the Milanese hold in the greatest veneration. He belonged to a noble family, and played an important role in his country at the time of the Spanish domination, toward the last half of the sixteenth century. He was nephew of the Pope Paul IV. Rigid critics reproach him for religious intolerance and the fury with which the fanatics, at his instigation, persecuted the Protestants of the Valteline; but this



Monument to Cavour, Milan.

manner of comprehending religion was quite in accord with the customs of the times. When the plague devastated Milan in 1576, he distinguished himself by the kindness he showed the unfortunate and the heroic zeal which he displayed during the entire duration of the epidemic. He was always by the bedside of the stricken. Frederick Borromeo, his nephew, to whom the Milanese have erected a statue, also distinguished himself during the plague which ravaged Milan in 1609, the description of which, so vivid and terrible, forms one of the most beautiful portions of Manzoni's romance entitled "*Les Fiancès.*" That which particularly appears worthy of admiration is that in the midst of the terrifying occupations of this public calamity he still thought of intellectual work, and founded a great library and conservatory of science and arts. He collected 44,000 volumes, which included 14,000 manuscripts. His statue is erected on the public place directly in front of the door of the library founded by him, and which, under the title of the Ambrosian Library, has to-day become one of the most important in Italy.

At the time when this cruel epidemic which decimated the population ravaged Milan, they were obliged to construct a lazaretto, to which was given a very monumental aspect. In the interior we still see a court-yard, three of whose sides are formed by a portico in the Moorish style, which recalls the Spanish domination. It is curious to note how the Arab style arrived in Italy upon two opposite sides, through the Venetians, who brought it from the East, and through the Spaniards who brought it from the South of the Iberian peninsula.

On the Place of the La Scala Theatre stands a fine monument erected in the honor of Leonardi da Vinci. The statue rests upon a pedestal whose four corners are decorated by statues of his four most illustrious pupils, and has a fine effect, all the figures being dressed in the garb of the fifteenth century. The head of Da Vinci in particular is full of nobility and expression. La Scala Theatre, which is built on this place, is the largest which Milan possesses, and one of the finest in all Italy, which contains several of the first rank. Its name is derived from the fact that the site whereon it rests was formerly occupied by the church of Santa Maria della Scala, founded by the wife of Bernabo Visconti, a daughter of the Scaligers of Verona. It was built in 1778 by the architect Piermarini. It has this peculiarity, that its construction was undertaken at the expense of a certain number of amateurs who were joined together for this purpose, and who recouped themselves for the outlay in less than two years by the rental of the boxes. The habit has been preserved in Italy, but especially in Milan, of holding a levee in the boxes; to there receive visits and prolong conversation even after the end of the performance, and in case of need to take light repasts, eat sweetmeats and drink champagne. For this purpose behind each box at the Scala is a finished room like a boudoir, with a divan, arm-chairs, table and so on.

Another curious Milanese structure is the Gallery Victor Emmanuel, which is a glazed public promenade richly paved with marble, where in winter-time people can promenade while it snows or hails without. This gallery is as wide as a street, and as high as a cathe-

Monument to Manzoni.

dral. In form it is a Greek cross, and is entered at each end of the four arms through glazed doorways. The central part, where the four arms of the cross meet, is covered by a vast octagonal dome fifty metres high, and ornamented at the height of the first story by the statues of sixteen illustrious men. The pendentives of the dome are also ornamented by four frescos, which represent Europe, Asia, Africa and America. Farther up are to be seen other frescos representing Art, Science, Agriculture and Industry. The total length of the gallery is 295 metres; and its height to the beginning of the glass is thirty-two metres. Each arm measures about fifty metres in length. The gallery was built in two years by an English company after the design of the Architect Mangoni. The first stone was laid in 1865. At night it is illuminated by more than two thousand gas-jets. It is used as a general rendezvous in which the Milanese gather to chat and loiter, and learn the news of the day and idle away those hours of the day and evening which in Latin countries hang heavy on the hands of those who are not through their needs engaged on some daily task. The chief entrance of the gallery opens on the cathedral square, through a vast monumental doorway, a full arch in form, which is prolonged on either side by porticos where the promenaders can easily circulate and find a shelter on rainy days or shadow during the summer.

Milan passes as the intellectual capital of Italy, and shows itself worthy of the name by the extraordinary number of museums which it possesses. The student can here find something to satisfy every

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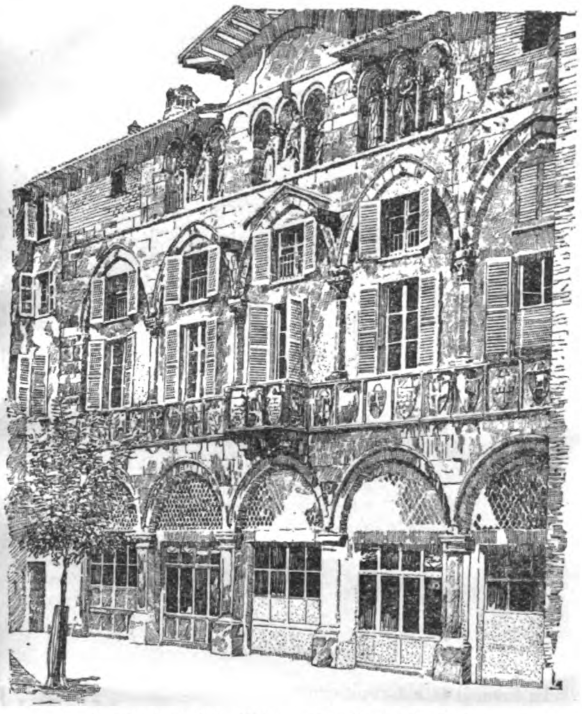
curiosity. The Palazzo Brera, which is also the Palace of the Sciences and Arts, contains unheard of treasures. Its architecture is very remarkable: the façade, imposing by its simplicity, impresses the visitor favorably. In the court-yard is to be seen the statue of Napoleon I, by Canova, who has represented the hero naked, holding in his hands a sceptre and a Victory. About the court are arranged statues of illustrious citizens of Milan. This palace contains a valuable library, a numismatic collection in which are more than 50,000 coins and medals, eight rooms devoted to paintings and sculpture and an archæological museum. Besides the Palazzo Brera and Ambrosian Library already mentioned, and in which there is a bust of Byron by Thorwaldsen, Milan possesses also a municipal art museum and a civic museum for collections of natural history, mineralogy and ethnography, the Museo Poldi, which contains a rare collection of jewelry and ancient arms, and finally the Palazzo della Ragione, where are stored the archives of the city, amongst which are found documents dating from the seventh century. The amphitheatre of the arena is an imitation of a Roman structure, built by the architect Canonica, the same one who built the Ionic arch of the Porta Ticinese. This amphitheatre is elliptical in form, measuring 326 metres on the major axis and 152 metres on the smallest. It can accommodate 30,000 spectators, and around the arena the architect has arranged a canal, which could be filled with water and used for naumachia. In 1807 a regatta was given in this way in honor of Napoleon I.

Like all the great cities of Italy, there is at Milan a royal palace, formerly the residence of the rulers of the city. The royal palace at Milan has nothing remarkable in its style, but it contains one of the rarest curiosities of architecture which can be mentioned. We can still see here a little church dedicated to St. Gothard, which serves to-day as the court chapel. The tower constructed by Pocoraro, of Cremona, is a very marvel of construction in terra-cotta. It was built in the time when Lombards excelled in this kind of work, but there now remain to us very few specimens of the kind, because



Loggia degli Osj. Milan.—Fourteenth Century.

of the relative fragility of the material employed. It cannot defy the ages as can granite and marble.

The traveller can also admire in the Plaza dei Mercanti the remains of the Loggia degli Osj, of severe and classic architecture, whose surbased arches of the ground story possess a rare boldness, although a little heavy because of their form. In the upper story we still see a range of niches containing statues. It is regrettable that blinds have been affixed to the windows within the pointed arches and to the windows in the story below. These modern wooden fixtures completely destroy the imposing sobriety of this design, which recalls to us the fairest ages of Italy and art.

The Italians inherited from their pagan ancestors a veneration for their dead. The cemeteries which we meet in the great cities of the Peninsula give us a very poetic and very attractive image of eternal rest. The final catastrophe which befalls all is here mitigated by a *mise en scène* full of seductive charm. The dead is not an inanimate being, completely insensible to external things—he sleeps, and they protect his sleep with all the marvels of art and love. They create for him a shade; they erect for him mausoleums; they make marble couches; as if at the awakening he must rise with a smile of gratitude for all those who during his temporary effacement have surrounded him with such tender cares. All this makes us think of the Etruscans, who enclosed in their tombs the favorite belongings of the defunct, the arms, utensils of his trade, the brush or chisel if he was an artist, and who also added lamps of exquisite design, fruits and wine, in order that if the departed should again awake, he might satisfy his wants and find at hand the objects with which he had been familiar during his existence on earth. Thanks to this the Italian cemeteries have always preserved a monumental air and one full of poetry. The Campo Santo at Pisa, the Campo Verano at Rome, San Miniato at Florence, the Cimitero di Staglieno at Genoa are necropoli which do not yield in beauty to those which remain to us from antiquity.

At Milan, beside the common burying-ground, where arise mausoleums which families consecrated to their relatives, has been built the Fancedio, destined to receive the ashes of illustrious men whose busts we see above their funeral tablets. The architect who constructed this pantheon very fully understood the kind of architecture which was suited to an edifice of this kind. The same architect built the crematorium in one part of the cemetery, which is used for the cremation of corpses. This building is constructed in a Greco-Egyptian style, sufficiently in consonance with its uses, as cremation of the dead was, according to the historians who have treated this question, first practised by the Egyptians. The practice of disposing of the dead by cremation in these days was first propagated in Italy and besides Milan several other large Italian cities have crematories. The Catholic Church has always combatted the idea as a reëstablishment of a Roman custom; but an English review, which voices the views of the Company of Jesus, published a short while ago an article in which it was said that the dogmas of the Catholic religion were not at bottom opposed to the destruction of corpses by fire. Nevertheless, those who remain faithful to the Roman faith make it their duty up to the present time to follow the system of inhumation as introduced by the early Christians in the catacombs.

[To be continued.]

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

HOUSE OF MISS C. O. JONES, OCHRE POINT, NEWPORT, R. I. MESSRS. PEABODY & STEARNS, ARCHITECTS, BOSTON, MASS.

[Gelatine print, issued only with the Imperial Edition.]

RESTORATIONS OF THE ROMAN FORUM BY LUIGI CANINA.

THESE plates will give an idea of the possible appearance of the Forum at the time it excited the admiration of Constantius as is narrated in the article on "Equestrian Monuments" elsewhere in this issue. Luigi Canina, from whose famous work "*Exposé historique et topographique du Forum romain*" (1834–45) these illustrations are copied, was born at Casal in 1793 and died at Florence in 1856. About 1829 he went to Florence and became architect in ordinary to Prince Borghese and was employed by him on excavations in the Roman Campagna and the Via Appia. After remaining here several years he passed to Turin and became professor of architecture in the Turin Academy of Fine Arts. In 1843, he was elected Associate Member of the Institute of France. His most important work was "*L' Architecture antique décrite et demontrée par les Monuments*," in nine volumes, published between 1830 and 1844.

VIEWS IN MILAN, ITALY.—SANTA MARIA PRESSO SAN CELSO; PANORAMA; INTERIOR OF THE CREMATORY, MACIACCHINI, ARCHITECT; ABBEY AT CHIARAVALLE; STATUE OF FREDERIC BORROMEO; INTERIOR OF SAN AMBROGIO.

COTTAGE FOR DR. EDWARD WIGGLESWORTH, JACKSON, N. H. MR. J. P. PUTNAM, ARCHITECT, BOSTON, MASS.

A MAUSOLEUM FOR MRS. L. C. HUCK. MR. A. CUDELL, ARCHITECT.

MEXICAN MUSICIANS EXEMPTED FROM MILITARY SERVICE.—There is a law here that whoever will learn to play well on one instrument and play on the plaza one or more evenings in the week shall be excused from military duty. The result is that every little town has a band that any of our large cities might be proud to own, and these public concerts afford one of the greatest pleasures of a visit here. As I write a fine band is at the door of the hotel serenading the black but comely prima-donna of a monkey and dog show who is stopping here. The semi-weekly concerts on the plaza serve the purpose of our fashionable walks and drives in bringing the people together to gossip and exhibit their clothes. The music commences at 9 P. M., and continues till midnight, during which time the plaza is crowded with people, though, to an American, it seems anything but gay.—*Exchange.*

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EQUESTRIAN MONUMENTS.—V.[1]

Bellerophon killing the Chimera. A Terra-cotta Bas-relief in the British Museum.

THERE was a special appropriateness in making an equestrian statue of Caligula, for he was unquestionably extravagantly fond of the animal, and one of the best known of his many mad freaks was proclaiming his horse Incitatus a consul, and endowing him with priestly functions also. Naturally no treatment was too good for so noble and intellectual an animal, and ivory manger and golden water-pail were his to use, while the less exalted animals of the imperial stud fared less luxuriously. Although this statue of Caligula, now in the British Museum, is but a piece of patchwork — the rider's head, arms and right thigh and the horse's near fore-leg and hind-leg, one ear and part of the mouth are pure restorations, while the off hind-leg contains only occasional fragments of original make — it stands high as a piece of art and would stand higher, and in spite of its size — it is only 6 feet and 8¼ inches high — but for the existence of the Marcus Aurelius. There is no sure proof that the statue really is a Caligula and not some later Cæsar: it has, however, been so styled since its discovery in the sixteenth century and will probably always be so known. It is one of eleven marble statues bought for $20,000 by the Museum authorities in 1864 from the Ex King of Naples, and before that time had a place in the Farnese galleries.

Amongst the less important pieces of antique equestrian sculpture now extant may be enumerated briefly a bronze horse found in the Baths of Constantine and now in the Palazzo Rospigliosi at Rome, and another found at Herculaneum and now in the museum at Naples; a group which represents a horse attacked by a lion, found in the bed of the Almo, and which very evidently served as the model for a similar group which supports one of the columns of the pulpit in the Cathedral of Siena; a horse in the grand ducal gallery at Florence which, being found near the spot where were found the scattered remains of the famous group of Niobe and her sons and daughters, is supposed to have borne one of the sons — who is fabled to have been slain by Apollo, while engaged in exercising his favorite horse; a bas-relief in the Villa Borghese at Rome which shows Marcus Curtius leaping his horse into a marsh — the fabled yawning chasm — to save Rome from destruction; and another bas-relief of the same hero in the gallery of the Earl of Pembroke at Wilton, England.

Horse from the Tomb of Mausolus.

To here speak of the great number of fragments of processional friezes in which the horse is introduced — the Panathenaic frieze, the Phigalian marbles, the Gigantomachia, unearthed by the Germans a few years ago at Pergamon — and the still greater number of sarcophagi representing battle-scenes in which appear horses, most admirably modelled, must be left for future treatment; but one fragment of exceptional merit should be mentioned, the head and shoulders of what is supposed to be one of the horses attached to the quadriga which crowned the famous monument erected at Halicarnassus in memory of Mausolus, King of Caria. If this bit of sculpture may be taken as a sample of the whole, no one will feel inclined to dispute the right of this monument to a place amongst the seven wonders of the world. Just when destruction overtook it is not known, but it probably fell a victim to an earthquake in the thirteenth century.

The vague speculations that have been sketchily presented as to the great losses[2] posterity can charge to the accounts of accident or malicious mischief in the matter of sculpture assume more definite shape as soon as an attempt is made to give some account of those equestrian statues of which little is left but the mere name, and the name is not a guaranty of the worth of the subject, as more of them are mentioned merely incidentally than formally described as art works of prime importance. When it is brought to mind that Roman leaders brought to Rome statues by the thousand[3] — three thousand seems to have been the canonical number for a proof of real prowess — it can hardly be doubted that among them must have been many equestrian. It seems fair to assume that some of these statues were small, perhaps nothing more than travelling gods which the pious took with him in his bosom or amongst his impedimenta wherever he went, and some of the early statues were probably not imposing in size; indeed, it is recorded that the equestrian statue which was erected to the honor of Clælius at Rome some four hundred years before our era was limited by law to a height of three feet, so its destruction by fire need not be considered a proof of a very great conflagration.

The art of founding made but slow progress, or else the early Romans did not have a great love for the horse, as it is said to have been a very unusual mark of honor that equestrian statues, at that time "a great rarity," should have been erected to Caius Mænius and Lucius Furius Camillus, the consuls who completed the subjection of Latium about 338 B. C., but nothing is said as to their being big or little: even the fact that the statue of Mænius was placed on the Columna Mænia at the end of the forum on the Capitoline does not give any clue, for though the base was unearthed and identified not many years ago, who can say how big an affair this column was. But earlier than any of these is recorded a myth that Romulus himself celebrated his victory over Fidenæ by erecting at Rome, perhaps about 700 B. C., a bronze group — himself seated in a quadriga and just to be crowned by a Victory. If this tale be true, this piece of sculpture not only long antedates the first Grecian quadriga which was set up before the Temple of Pallas at Athens about 500 years B. C., but shows how common a thing working in bronze must have been for it to be possible to do such a work in a raw and recently founded town. To be sure, it is generally conceded that bronze-founding was known to the Romans at an earlier date than to the Greeks, but two hundred years is a long lead for the less artistic nation to have gained over the other.

Vases and coins[4] show how common an element in design was the horse and rider, and the many vases which were decorated with incidents that were common in the hippodromes and circuses, and the knowledge that these great gathering-places were decorated with multitudes of statues suggests unavoidably that if here were to be found statues of boxers, foot-racers, wrestlers and gladiators, here, too, must have been seen many a statue of a favorite jockey on his no less famous horse, and many a charioteer in biga or quadriga guiding his clumsy vehicle swaying behind the flying steeds. Fragments that have come to us are, then, quite as likely to be parts of the ignoble hero of the race-course as portions of some patrician soldier raised to the rank of demi-god in honor of some conquest

Hiero II. Caius Metellus. Clœlian Gens.

[1] Continued from page 90, No. 661.

[2] STATUARY AS PROJECTILES. — During the siege of Byzantium by Septimius Severus the citizens "precipitated from the walls upon the heads of the besiegers entire bronze statues not only of standing but of equestrian figures." "When during the reign of the Emperor Justinian, Theodotus, King of the Goths in the year 537, laid siege to Rome by his general Vitiges and the mole of Adrian was assaulted the besieged defended themselves by throwing statues down upon the heads of their enemies." — *Winckelmann's "History of Ancient Sculpture."*

[3] NUMBER OF ANCIENT STATUES. — "189 B. C., M. Fulvius Nobilior conquered the Aitolians and Ambrakia, that city which had been the residence of the art-loving Pyrrhos, King of Epeiros. From this favored spot, as well as from other places in Greece, the Roman general carried off an almost incredible amount of booty which should make his triumph even richer than those which had preceded. We are told, that he also brought Greek artists with him to direct the artistic arrangements of his celebration. In his triumphal procession were seen two hundred and eighty-five statues in bronze, as well as two hundred and thirty in marble." "About twenty years later, Paulus A. Emilius made a most brilliant entry into Rome, after having conquered Perseus of Macedonia, at Pydna, 168 B. C. Three days long it lasted, and two hundred and fifty chariots full of works of art, statuary and painting, could scarcely pass in on the first great day." "Another twenty years passed, and Metellus Macedonicus in 148 B. C., celebrated his victory over Pseudophilippos, by a triumph in which were very many statues from Dion in Macedonia. Among these was Lysippos' celebrated group in honor of Granicos, representing Alexander and twenty-five mounted warriors." — *From Mitchell's "History of Ancient Sculpture."*

[4] COINS. — A coin which bears on its obverse an equestrian figure standing on a base pierced by three arches with the legend M. ÆMILIO LEP. is supposed to commemorate the building of the Pons Lepidi 179-142 B. C., and may or may not also be taken as proof that an equestrian statue of the projector finally adorned his completed work.

Another coin inscribed MAR. PHILIPPVS AQVAM bears a mounted figure supported by the many arches of an aqueduct and may indicate that the Marcian aqueduct once upheld an equestrian statue of Quintus Marcius Rex, who in 144 B. C. began to build the aqueduct which when complete measured some sixty-one miles.

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which won him the applause of senate and people: or they may be parts of some ostentatious piece of decoration which some one took a

Quintas Salienus. Cassander. Amyntas. Audoleon.

fancy to bestow on his native town, such as the troop of gilded horses that Scipio Metellus set up in the Capitol; or the four gilded horses which Herodes Attacus, the famous orator, presented to the city of Corinth at a later period in the second century of our era, horses, by the way, which rested or pranced upon ivory hoofs.

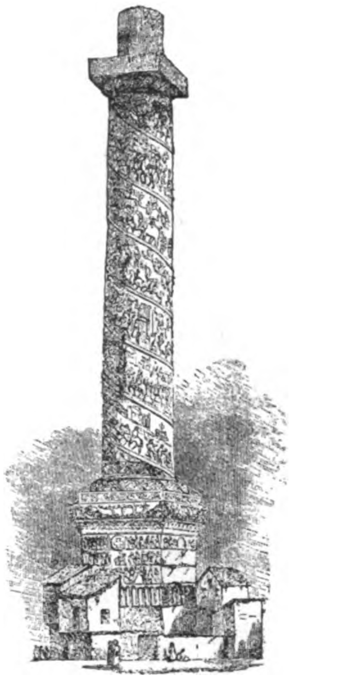
Antiochus VI. Horatius Cocles. Attila Gens. Nero Claudius Drusus.

The gilding[1] of bronze statues seems a little like refining pure gold and about as ineffective, for to many people there is no pleasure in looking at a bright bronze statue, which is often as effulgent as a fully gilded one could have been, and modern taste requires that the patina of antique bronzes should be simulated by a chemical treatment of the surface. Whether the gilding was applied for the purpose of increasing the decorative effect, or whether it was in-

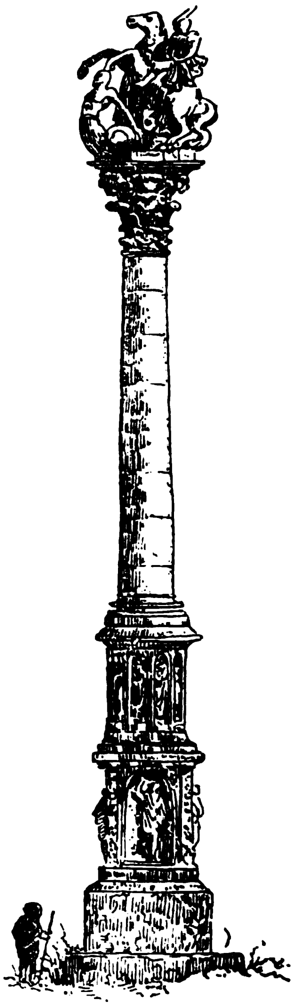
Bronze Horse from Herculaneum, in the Museum, Naples.

tended as a protective coating is not clear, nor if this last was the intention, is it clear that it was not a mistake, as a galvanic action between the gold and some of the bronze alloys may have been established to the injury of the surface of the latter. At any rate the haunches of the horse bestridden by Marcus Aurelius are pitted with corrosions which may have been caused by such chemical action. The sheen of the gilded statue certainly nullifies the effect of much of the modelling, as can be seen in the equestrian groups which surmount the proscenium-wall of the Nouvel Opéra, at Paris, whose really fine modelling would never be suspected, because in sunshine the glittering reflections entirely prevent one from perceiving the true forms.

By a stretch of the imagination the modern employment of a horse for a weather-vane may be accepted as all that survives of a custom, that had some vogue in ancient times, of setting an equestrian statue as high aloft as possible on the summit of a pillar or column. A little gilt figure of a horse a few inches high cavorting on nothingness is absurd enough in its inappropriateness, and it would seem that a large statue on the top of a lofty column would have been equally out of place and generally a most unsatisfactory piece of work, as from most points of view it must have been distorted through foreshortening. Moreover, a horse and rider elevated to such an altitude can hardly be accepted as being naturally posed, although there are many European towns where there exist legends that once upon a time such an one rode his horse up the winding stair of such a tower, and after accomplishing his aimless feat rode safely down again. A mounted figure crowning one of these historic towers, such as the Giralda at Seville, or the Church of the Savior at Copenhagen, would account for itself on the ground of symbolic value. Mention has already been made of the statue of Mænius that crowned the Columna Mænia in the Forum at Rome, and there are records of others, such as the statue of Probus on the column at Merten, near Metz, erected in honor of his victory over the Germans, and of which the annexed cut is a more or less authentic record. But the



The Column of Theodosius at Constantinople.



The Column of Probus at Merten near Metz.

most interesting and elaborate structure, one which from its size must have seemed dignified, was the famous column at Byzantium one hundred and five feet high, which was erected near St. Sophia in 543 by the order of Justinian in honor of his victory over the Persians, and is reputed to have existed in a more or less dilapidated condition till as late as the sixteenth century, when, it is likely, the Mohammedans gave it its *coup de grace*. The artist Eustathius, who is said to have been a Roman, was probably inspired by a recollection of Trojan's column, but in place of erecting a piece of marble sculpture he built a brick core, covered it with bronze plates, and then placed on the summit a bronze statue of Justinian, which is said to have been some thirty feet high, and hence holds a place amongst the largest equestrian figures ever modelled. Other authorities say that the crowning figure represented Theodosius.

Horse-tamer. British Museum.[2]

What might have been the merit of the equestrian statue of Trajan which stood near to his triumphal column in the midst of his forum may be surmised from the effect it had on Constantius II, when, in 357, he visited Rome and was overwhelmed with the magnificence he saw all about him. Feeling that it would not be possible to reproduce in his Eastern capital the glories of the Western city, he contented himself with expressing a desire to have a replica of the horse of this statue, and for his modesty was most cruelly snubbed

[1] Gilding.—"A *quadriga* with the Rhodian sun-god, by Lysippos, so pleased Nero, that, in a burst of barbarous enthusiasm he caused it to be covered with gold. But this treatment so detracted from the artistic worth of the work, that the removal of the precious metal at a later day was considered only to have increased its value, even though ugly scars were left behind."—*Mitchell's "History of Ancient Sculpture."*

[2] From Müller's "*Denkmaler der Alten Kunst.*"

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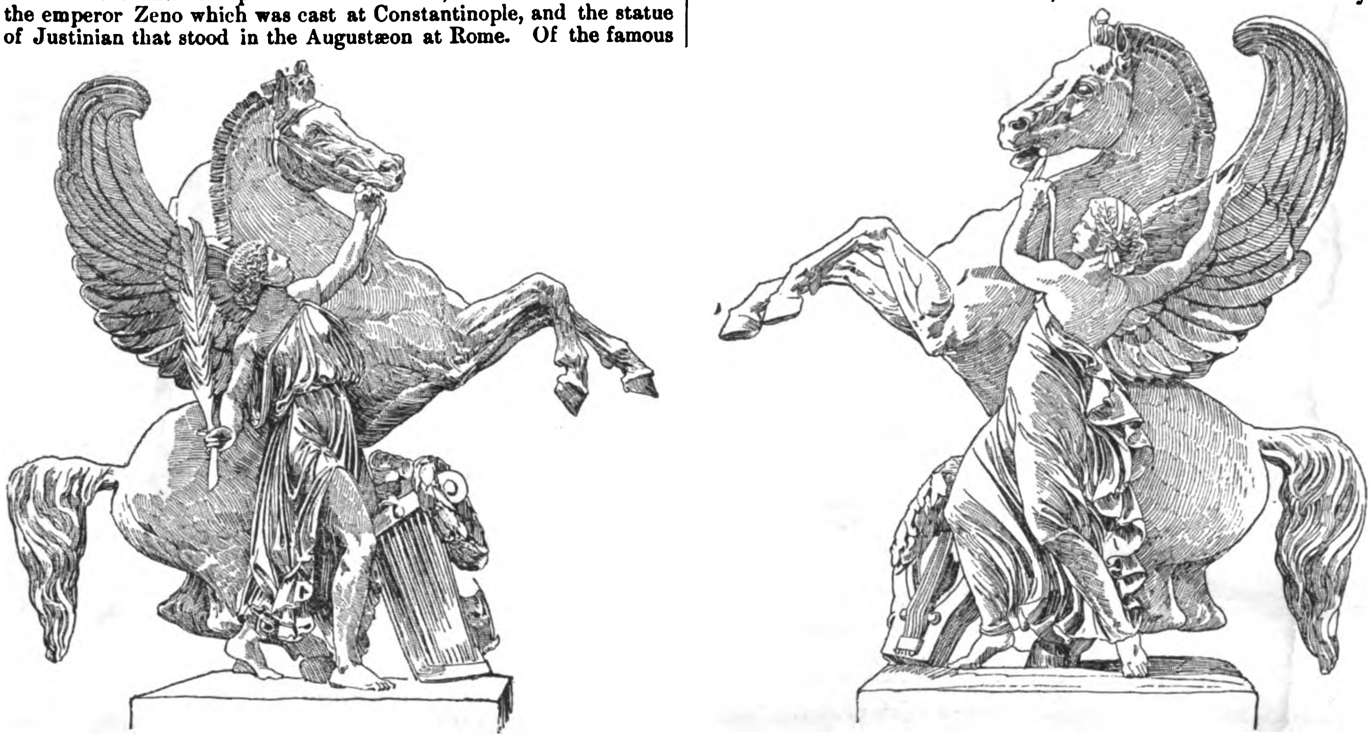
by a travelling-companion, the Persian Prince Hormisda, who suggested that he must first "order a similar stable to be made for him, if that be possible, so that your horse may be lodged as magnificently as the one we behold."

In 1878 much interest was excited at Rome and elsewhere by the raising from the bed of the Tiber of fragments of a colossal equestrian statue in bronze, which, for a time it was thought possible might be all that remained of the noted statue of Domitian, which formerly stood in the forum where the base has recently been discovered. This statue represented the emperor as the conqueror of Germany, trampling on a figure which represented the Rhine.

In the case of most of these lost works little is known but their names, but as a mere matter of record it may be well to enumerate a few of them, as for example, the one which Sulla set up before the rostrum to celebrate his victory over Mithridates in 81; those which the Roman merchants set up in honor of Verres; the one at Ravenna of the emperor Zeno which was cast at Constantinople, and the statue of Justinian that stood in the Augustæon at Rome. Of the famous group of Alexander and twenty-four horsemen which was last heard of as adorning the portico of Octavia, it is known that it was modelled by Lysippus in honor of the victory at the Granicus, and was erected at Dion in Macedonia, whence it was carried to Rome by Metellus by whom it was placed before the temple of Jupiter Stator, and was thereafter probably shifted about from place to place according to the whim of the ruling power, and at length may have been carried back to the neighborhood of its place of origin when the other works of art were packed off to Constantinople. That there should not be left one of the eighty statues of Augustus — of which some at least were equestrian — is not to be wondered at, seeing that many of them were of silver, and consequently likely to lose in the melting-pot their value as works of art.



Equestrian Groups on the Proscenium-wall of the Paris Opera-house.

In the Vatican Museum.

Besides the single equestrian figures there were many groups of statuary in which the horse was harnessed to the triumphal chariot, in pairs, in fours, or in sixes. The custom became so commonplace that it was a very welcome innovation when some sculptor in the times after the African campaign, conceived the idea of having his mimic cars of triumph drawn by elephants, and thereafter the strange beast crowned more than one trophy at Rome.

The group, now in the Vatican, of a lion who has seized a horse, is but one example of many pieces of sculpture in which the untamed and unmounted horse was the centre of interest, for there were sculptors in those days who devoted themselves as exclusively to modelling animals as Barye did in our own time. Amongst such sculptors may be named Calamis, of Athens, and Strongylion, who worked at Athens about 415 B. C., and there executed the famous statue of the Trojan Horse which formerly stood in the Acropolis, and in the identification some years ago of the base on which it stood, a passage in the "*Birds*" of Aristophanes not a little assisted. This statue was of bronze, and was identified with its story by having in one side a window, from which Menestheus, Teucer and the sons of Theseus peered as if to see whether all Troy yet slept. Menestheus was selected with much appropriateness for this purpose as he excelled all the leaders of the Greeks in the manipulation of cavalry. The Trojan Horse was probably commemorated by statues in other places also, at any rate one was erected by the Argives at Delphi about 405 B. C., the work of Antiphanes of Argos.

The horse and chariot was always a favorite with both Greek and Roman sculptors, and records exist of many such groups, as for instance, the bronze group modelled by Agelidas, the master of Phidias, Myron and Polycletes, which commemorated the victory of Cleisthenes at Olympia in 576 B. C., and showed him standing in his chariot, while his driver guided the four horses who shared the immortality of victory by being inscribed with their respective names. While Praxiteles, the grandsire of his more famous descendant of the same name, modelled the charioteer for a group by Calamis in order that the human figure might not be unworthy of the horses, in the portrayal of which Calamis excelled, while as a sculptor of the human figure he ranked less high. Pliny speaks of his horses as "*equis semper sine æmulo expressis*," — beyond all compare horses. This chariot is supposed to have been the one which stood on the Acropolis, erected

From the Gallery of the Earl of Pembroke at Wilton.

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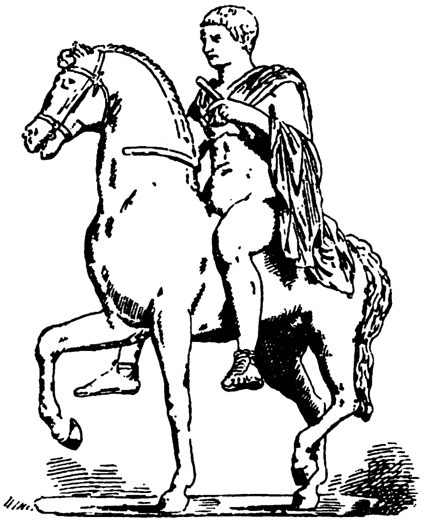
in memory of the victory of the Athenians over Chalcis in Eubœa, and its erection there is testimony to its superlative merit. It is known, too, that Pythagoras executed a bronze chariot group at Olympia in honor of the victory of Cratisthenes, a native of Cyrene. In this group the victor was his own driver but he had a companion in the shape of a Victory.



Caligula. In the British Museum.

But the victors in chariot-races were not the only ones honored with statues. Canachus, of Sicyon, modelled a group of boys racing their horses, and Dædalus, also, modelled a boy who had just won a horse-race — evidence this that light-weight jockies were valued in those days. Another evidence of the popular esteem for horse and horse-lover may be found in the fact that a bronze statue of Simon, a man who not only rode horses but wrote authoritatively about them, was made by Demetrius of Alopece.

These antique equestrian statues did not always have to be of colossal or even natural size, for Dionysius made a statuette in bronze of a famous little mare with her groom beside her: the companion group, a horse and groom, was modelled by Simon, an Æginetan sculptor.

Victors of Games. — "Glaukias executed for Gelon of Syracuse a chariot and four horses (*quadriga*) in honor of a victory in the Olympic chariot-race, and added a statue of the owner, that Sicilian tyrant."[1] — *Mitchell's "History of Ancient Sculpture."*

Terra-cotta Quadriga. — "On the acroterium of the temple of Jupiter Optimus Maximus erected by Tarquinius Superbus,[2] stood a quadriga of *terra-cotta*, which is related to have swollen prodigiously in the baking; an omen thought to portend the future greatness of the city." — " *From Dyer's "History of the City of Rome."*

Pet Horses. — Lucius Verus when consul caused a statue of his horse Volucris to be set up in the circus.

Caligula. — Caius Cæsar Augustus, third Roman emperor, son of Germanicus and Agrippina, born A. D. 12; succeeded Tiberius in 37;. after the promise of a beneficent reign, gave way to the caprice and cruelty of a madman; exhausted Italy by his extortions, and plundered the provinces, until murdered January 24, 41.

Probus. — Marcus Aurelius Probus, Emperor from 276 to 282 A. D. Born at Sirmium. Son of a military officer of moderate fortune. He early entered the army and rose rapidly to distinction, finally becoming commander of the whole East and on the death of Tacitus was by the army made Emperor. His reign was mainly spent in successful wars. One of his principles was never to allow the soldiers to be idle and to employ them in time of peace in useful work. This increase of duties was naturally unpopular with the troops, and while the Emperor was urging on the draining of the marshes of his native place he was slain during a sudden mutiny. Scarcely any emperor has left so good a reputation. His death was mourned alike by senate and people and even the soldiers presently repented and raised a monument in his honor.

Domitian. — Titus Flavius Domitianus. Born at Rome, October 52 A. D. The only tyrant among the succession of good and just princes from Vespasion down to Commodus. Succeeded to the throne in 81. Erected many public buildings and temples and restored the temple of the Capitol, on the gilding of which alone (according to Plutarch) he spent the equivalent of £2,500,000. He was cruel and profligate, though while popular during the first part of his reign, he ruled well. He arrogated to himself divine honors. Murdered September, 96.

(To be continued.)

THE GREEK ANTIQUITIES SCANDAL.

Athens, Greece.

The sensational suicide last week of M. Psimoulis, the universally respected President of the Police Department of the kingdom, is only one of the consequences of the extraordinary revelations of what is now popularly known as the "Antiquities Scandal" —revelations which have spread consternation in every capital of Europe, and which may affect in an exceedingly disagreeable manner many public institutions and private citizens in the United States.

Within the past month the Louvre Museum at Paris, the British and South Kensington Museums in London, the Imperial Art Museums at Berlin and Vienna, together with a host of minor establishments of kindred character, have been forced to surrender nearly all the most valuable specimens of ancient Greek art which have come into their possession during the last eight years. In order to realize the effect of this, it is only necessary to remember what enormous sums are annually devoted by the various Governments of the Old World to the maintenance and increase of their national collections of ancient art. Baron Alphonse de Rothschild at Paris and the Dukes of Sutherland and Westminster in England have likewise been forced to follow the example of their respective Governments in the matter, and, at the present moment, all the well-known private art collections in Great Britain, France, Germany, Austria and Italy are, at the instance of the Greek Foreign Office, being submitted to a most searching perquisition on the part of the police.

The fact is that it has been discovered that almost all of the best specimens of ancient art which have been shipped from Grecian ports since 1879 have been purely and simply stolen from the Royal Central Museum of this city and from other similar Government institutions and collections in the provinces of King George's turbulent little kingdom. The thefts have been perpetrated on a most gigantic scale, and a ring of the most prominent officials of the country has been found to be implicated in the matter. Among their number are the directors of the Central Museum at Athens and of the other national art collections, several of the principal surveyors and collectors of the Customs department, the Chief of Police, whose death by his own hand has already been alluded to above, and four of the most eminent professors of the University here — one of whom by the way, was the ringleader of the band. Beginning in a very small way some eight years ago, they gradually extended their operations, and soon accumulated large fortunes. Indeed, the magnificent marble palace of the professor and chief of the gang is one of the show-places of modern Athens. The disturbed and unsettled state of the political affairs of the country contributed in a great measure to their immunity from detection, and they at length grew so bold and venturesome in their thefts that we actually hear of the late Chief of Police proceeding three and four times a year to Paris and London in order to effect settlements with the dealers to whom the stolen goods were consigned.

The thefts might have gone on indefinitely had not the attention of a Greek diplomat in London been attracted to the news of the acquisition by the British Museum of a magnificent marble bust of Adrian. On terms of acquaintance with the directors of that institution, he was invited quite incidentally one night at a dinner-party, by one of their number, to inspect their latest purchase. Hardly had he set eyes on the bust, when he was startled to recognize it as having been one of the gems of the Royal Central Museum here. He immediately began an inquiry as to how this almost priceless piece of statuary had come into the possession of the art-dealers from whom it had been purchased by the British Museum, and in course of time succeeded in discovering that it had formed part of a shipment which had been disposed of in London by a well-known Athens lawyer, nearly related to the director of the Museum here.

It was just about this time that the great robbery was committed at Paris on Messrs. Feuardent & Rollin, the well-known art-dealers of the Rue Louvois. The burglary, which made much noise at the time, was so cleverly executed that the French police at first announced their positive conviction that it was the work of American "cracksmen." The losses of the firm were enormous, including an immense number of ancient and exceedingly rare Greek coins of a particular date and style. Elaborate and minute descriptions of the same were published in the French press and copied by most of the foreign newspapers, including those of Greece. The very moment the description of the missing coins was read here in Athens, it was at once remembered that they had formed part of the most celebrated finds of the past three years and that they had been placed at the time for safe keeping and exhibition in the Royal Central Museum here. There was no doubt as to the identity of the coins, for none other of the same date and style are known to be in existence. How then could they have found their way into the possession of Messrs. Feuardent & Rollin at Paris?

The coincidence of this question, together with the arrival of the confidential diplomatic report from London concerning the presence of the famous bust of Adrian in the British Museum, induced Prime Minister Tricoupis to make a most searching and minute examination of the national collections in the Museum here and elsewhere throughout the country. The result, as might have been expected, was simply appalling. Many of the ancient masterpieces, and, in fact, almost everything of any value, had disappeared, and it is incredible that the absence of so many well-known chefs-d'œuvre should have escaped the notice of the public for so long. Of course, the Director-General of the Museum here and several of his principal officials were immediately placed under arrest, and, after much difficulty and persuasion, were induced by the authorities to make a full confession of the names of the other members of their ring and of the extent of their operations. This led to the apprehension of the whole band with the solitary exception of the president of the police department, who unable to face the terrible disgrace in store for him, blew out his brains in the presence of his wife and child at the very moment when the warrant was about to be served on him.

A comprehensive list — startling in its length — of all the objects missing from the Museum here and from the other national collections, was most carefully compiled, and copies thereof dispatched to the various Greek Legations abroad. The latter were instructed by Prime Minister Tricoupis to spare no efforts in effecting the discovery and restoration to the Hellenic Government of the stolen master-

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[1] A part of the pedestal of this group, bearing an inscription with the artist's name was discovered at Olympia in 1878.

[2] King of Rome in the sixth century B. C.

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pieces; and in cases where the surrender thereof was refused, the Legations were ordered to invoke the aid of the local police for the purpose of compelling restitution. Nor could assistance of this nature be withheld by the foreign governments in question; for in every civilized country, the laws are clear and definite in declaring that stolen property, no matter in whose possession it may be at the time, must be restored without indemnity to the original owner thereof. In the case of the British Museum and, in particular, of the Paris Louvre, this compulsory restitution represents an exceedingly heavy loss, not only from an artistic, but also from a financial point of view, enormous sums having been spent by M. Waddington, when Minister of Fine Arts, in the purchase of masterpieces of ancient Greek art.

Bad as all this is, there is still worse in store for the public and private collections of Greek art abroad. The scandal above described has had the effect of attracting popular attention to an important law passed by the Greek Legislature and sanctioned by the King in 1872, which has hitherto been far more honored in the breach than in the observance. As it is of the utmost importance that every purchaser of a Greek antique should be aware of what the risks are to which he exposes himself, it may be of interest to give the following principal paragraphs of the statute in question, the terms of which are almost analogous with the French laws on the same subject.

Sec. 6. Any person who discovers an antique on or in ground constituting either Government, Crown or public property, is bound hereby to immediately notify the Government thereof, all antiques thus discovered being regarded as the sole property of the Government. It is left to the discretion of the latter whether or not to reward the finder, the matter being entirely optional to the Council of Ministers. Any failure on the part of the finder to notify the Government of his discovery is regarded as an act of embezzlement and theft, and punishable as such with penal servitude.

Sec. 7 (*a*) If the antique is found on or in ground constituting private property, the finder is bound under the same penalties described in the preceding paragraph to notify the Government of his discovery within three days thereof. In such cases the Government is regarded as owning one-half of the antiques brought to light, the other half becoming the property of the finder.

(*b*) If the latter is anxious to sell his half of the find, he is bound to give the Government the option of purchase, and it is only in case the Government declines the offer, in writing, that the finder is at liberty to dispose of his half, but only to a purchaser resident in the Kingdom. Neither the purchaser in question, nor the finder, are allowed to export any portion of the find, unless provided with a written and sealed permit by the Government.

Sec. 8. Any antique, no matter to whom it may belong, which is exported without being provided with a permit signed and sealed by the Minister of the Interior, becomes, from the moment it passes beyond the Greek frontier, and *ipse facto*, the exclusive property of the Hellenic Government.

It may safely be asserted that not even ten per cent of the shipments of antiques which have left Greek ports within the past eighteen years have been provided with the necessary official permit. That being the case, their retention by their present possessors constitutes an illegal act, since they are the property of the Hellenic Government, which is legally entitled to demand their restitution. The latter cannot be denied. For when it can be proved that the vendor was not entitled to the legal possession of the goods sold, the rights of the purchaser to the ownership thereof become annulled, and those of the most recent legal proprietor alone remain. The law on this subject is exceedingly explicit in Great Britain, France, Germany and Austria, and there can be no opposition thereto wherever the Greek Government chooses to demand its enforcement.

The popular demand for the stringent application of this law concerning the export of antiques has led to the very strictest kind of watch being established by the revenue officers in the ports of the Piraeus, Nauplia, Corinth, etc. In fact all travellers leaving the country are submitted to a most objectionable personal search on the part of the authorities, with a view of preventing any antiques being smuggled out of the country. No person or object is allowed to leave Greece without undergoing the closest kind of examination. This, however, has led to the Greek Government being placed in a most amusing quandary. One of the principal articles of export from Greek ports is forged antiques, which it is asserted are mostly shipped to the United States. Since the present strict watch has been established on all outgoing freight, the Government can no longer pretend to ignore the trade. By officially sanctioning it, King George and his Ministers become parties to the swindle, while if it is prohibited, a death-blow will be struck at one of the most profitable branches of Greek industry and commerce. — *Correspondence of the New York Tribune.*

The Corn of The Pharaohs. — Mr. David Drew of Plymouth, planted last spring some corn taken from a mummy exhumed in Egypt, and estimated to be 4000 years old. The stalks are now about six to six and a-half feet high. The leaves alternate on the stalk like common corn, and have the white mid rib of sweet corn; but the product of the plant is the most singular part of it, for, instead of growing in an ear like modern corn, there is a heavy cluster of small twigs in place of the spindle which hands downward from its weight, and each twig is thickly studded with kernels, each of which is in a separate husk. — *Boston Herald.*

COMMUNICATIONS

WHY WE PUBLISHED A CERTAIN ILLUSTRATION.

To the Editors of the American Architect: —

Dear Sirs, — Whilst I fully appreciate the trials that beset the editor of an architectural journal and realize that endless patience and tact are required to even approximately satisfy the importunities of ardent contributors I cannct believe that the exigencies of politic journalism demand that subscribers should suffer the infliction of such reproductions as the "Studies by Architectural Students" in your issue of Sept. 1.

That *these studies are simply the work of students* is no plea for their publication — nor for their suppression. Your paper has in its day published student work of merit, showing ability, good training, promise of development and good draughtsmenship. When these qualities can be shown in anybody's work — students' or practitioners' — let it be published; but when none of these qualities are apparent I maintain that to publish the work does a positive harm to the author, to the reader and, most of all, to the journal itself.

I write this in no unkindly spirit, but as one interested in the proper encouragement of architectural training and in the continued good name of your journal. An Initial Subscriber.

[We are sorry that "An Initial Subscriber" seems to belong to the class who subscribe for the sake of "the pictures" only, else it could not have escaped his notice that the print of which he complains is an illustration of an article describing the work at one of the institutions which undertake to give instruction in architecture. If our correspondent holds that it is not our duty to give full information concerning these institutions, we cannot agree with him. Those who selected the material presumably picked out the most praiseworthy drawings. — Eds. American Architects.]

THE SPIRES OF STRASBOURG AND COLOGNE CATHEDRALS.

Louisville, Ky., Aug. 28, 1888.

To the Editors of the American Architect: —

Dear Sirs, — In the article "Italian Cities" of your last issue occurs the passage that the highest piece of masonry, which exists in Europe is the tower of the Strasbourg Cathedral with 426 feet. I take the liberty to state that there is a higher church building in Europe; namely, the Cathedral in Cologne on the Rhine, the spires of which are over 500 feet high; they are the highest church towers in Christendom. They were completed within the last fifty years after having remained in an unfinished condition for several centuries. The most remarkable thing about these towers, aside from their height, is that they have been executed from the original drawings, which were found by chance. They are built in stone to the top. Reader.

A DISPUTE OVER IMPERFECT WORK.

New Orleans, La., August 29, 1888.

To the Editors of the American Architect: —

Dear Sirs, — We write to ask you to settle a dispute between a building-committee and ourselves. The points in question are these: A flat roof in which rest heavy timbers carrying large water-tanks was built with so little fall that the water lies in the centre and is calculated to rot the bearing timbers. The other point is, galvanized-iron hip-rolls that are so constructed that they leak and will have to be taken off. The building is a very large one covering a piece of ground 160 x 250 feet. We were not allowed a clerk-of-the-works and had to superintend the construction without this aid, and these points escaped our notice. The building was accepted by us and by the building-committee, and now these defects show themselves some ten months after acceptance of the structure, and notwithstanding the "General Condition" clause of specification which reads as follows: "The builders must give bond for the repairs of all roofs, gutters, and in short all of his work that may require repairs for the period of twelve months," the building-committee demand that we, at our expense, repair and make good this construction. We hold that the contractors are the responsible parties. Please decide and oblige. S. & T.

[If the roof-timbers were not properly levelled, it is the builder's duty to make them right. If the hip-roll was improperly made or put on it is for the person who made it or put it on to replace it properly. It is absurd to expect an architect to see everything that may be out of the way about a building. If his plans and specifications are skilfully prepared, and he looks over the work carefully during a reasonable number of visits of the usual length, and orders the correction of such mistakes as he sees he has done his duty, and the owner has no claim against him for not being omniscient. His certificate or acceptance of the building does not alter the case. It is well settled that the architect's certificate is simply an expression of his opinion about the building, and not in any way a guaranty of the work. Even if his opinion was a mistaken one, he is not liable for any damage unless the mistake was the result of gross carelessness or ignorance, and an erroneous certificate of the completion of the building does not free the builder in the least from his obligation to complete it according

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to contract. Architects and owner would do well to remember that the architects' duty is to furnish proper and skilfully made drawings and specifications, and scientific directions ; and the builders' is to perform the contract to the letter. The architect helps the owner by endeavoring with reasonable diligence to detect violations of the contract, but he never in the smallest degree takes the place of the contractor.—Eds. American Architect.

NOTES & CLIPPINGS

The Claim of Greece to Grecian Antiquities.—Speaking of the plea of ownership in everything dug out of her soil, recently put forward by Greece, the *London Telegraph* says: Once the principle of the right of antiquarian capture, subject, of course, to the proper provisos of the law known as "treasure-trove," was lost sight of; once the archæologist, spending years of his life and labor in research of buried truth to be brought to light for the good of all thoughtful mankind, was reduced to the level of a petty thief or a well-meaning burglar, and there would be an end to the study of the past. We should have the Ptolemies crowding from Cairo to claim the mummies of their ancestors, and some Babylonian and Assyrian gentlemen whirling up to Bloomsbury to demand the winged bulls that once decorated their forefathers' halls and palaces. Moreover, the situation would become still more complex; indeed, a European war could scarcely be obviated if by any chance a "Queen Annie's farthing" were found on an island of the Archipelago, or an Irish bronze Celt discovered among the curiosities of some travelled Corinthian collector. We have no wish to press the point that Greece seems to have taken of late to the manufacture of her antiquities, and retell the story of the recently confiscated Piræn fragments of evidently modern workmanship, which had been broken for the mystification of the credulous. It may, indeed, be that Greece feels that her simple sons are rather tending to flood the market with counterfeits, and that she has need of recovering her waning dignity. Nor is it needful to reiterate that some of the best "bits," in Greek collections come from European Turkey and Asia Minor, and, on a similar ground to that advanced by the Hellenes, ought to be sent back by parcel-post to Constantinople; we rather base our objections to this proposed cry of "Give them back" on the long recognized right of skilled antiquarians to seek and find and store as they please. If the "goods" found are of great intrinsic value, and the government of the country where they are found never thought of digging them up for themselves, let that country by all means be compensated for their loss, or let investigation, as is generally the case, only be allowed to take place by virtue of a "firman," or some similar potent instrument. But a sort of general redistribution of antiquities all over Europe, a scientific sorting of artistic treasures, is a wholly impossible and ridiculous scheme.

The Accident at Seville Cathedral.—Further particulars of the fall of a pillar of the Seville Cathedral are now at hand. It was about three o'clock in the afternoon when the people of Seville who lived near the Cathedral (writes a correspondent of the London *Daily News*) were suddenly startled by a loud report. They at first fancied that it must be a repetition of the earthquake of 1884. Soon a cloud of dust filled the air, and those that rushed out were told that some terrible accident had taken place in their beautiful Cathedral. This bad news astonished nobody, as it had been expected. Many, indeed, for some time past, never entered the church without some misgivings. Fortunately, no one was in the building at the time. It happened to be the hour of the "siesta," when only those who have something particular to do are in the streets. It was ascertained that one of the stone columns that had long been in a dangerous state had given way at last, bringing down with it a considerable portion of the nave over the choir. The fine organ and all the beautiful carved "Silleria," once the glory of the Carthusian monastery before it was transferred to the Cathedral, were much damaged. The architects say that they had repeatedly called attention to the condition of this part of the Cathedral, but that, not expecting any immediate collapse, they had paid more attention to other parts of the church, which are in an equally dangerous condition. Even the lovely Giralda tower is reported to be in a very unsatisfactory state. The Cathedral has been closed by order of the authorities, and it will probably be some years before strangers can again visit the greatest attraction of the Andalusian city.

Berlin, Germany.—Under the heading of "New Berlin," many interesting particulars of the progress of the Prussian capital since 1871, have been gathered together by Professor Paloczy, and contributed as a feuilleton to the *Neue Freie Presse*. There are now, it seems, 25 public libraries in Berlin, with more than 100,000 volumes. Vienna's 29 public squares are compared with 58 possessed by Berlin. Though Vienna has its Prater and Paris its Bois de Boulogne, Berlin surpasses both in its Grünwald, with its immense extent, its hills and vales, its woods and lakes, villas and hunting-lodges. The northern limit now lies close to the houses of Charlottenburg, the largest suburb. Berlin expends yearly more than 10,000,000 marks on the poor, and mendicants in the streets are unknown. The citizens take pride in serving their city without reward. More than 12,000 of them are now thus working for the town, while the number of paid officers is comparatively insignificant. More than half of the 31 magistrates who carry on the direction of affairs in the "Red House" have no salary, though their office is no sinecure. This unselfish devotion to the general well-being is the sure guaranty for the further development of the city. It is only four years ago that the Prussian Landtag voted 4,000,000 marks for the increase of the royal museums of Berlin. Several millions of marks have been recently voted for deepening the bed of the Spree and for improvements of the Upper Spree canal, which will greatly facilitate the trade of the city. The city railway costs enormous sums. The ministerial palaces, though simple in style, have luxurious and commodious interiors. Four monumental post-offices and the magnificent Polytechnic at the west end of the Thiergarten are the boast of the city. The new palace of the Reichstag in the Königsplatz is rising from its foundations, and in less than three years it will probably be the greatest ornament of the city. A striking illustration of the progress of Berlin is the almost unexampled increase of the students in the University, who numbered in 1887 no less than 6888. At this moment the University of Berlin is the most frequented in the world; that of Vienna comes next. The number of professors is about 300. The pupils in the new Polytechnic number more than 1200, and all other schools are in a flourishing condition.

TRADE SURVEYS

Builders complain that they have not been favored with the same concessions in prices on building-materials, that have been made on other manufactured products. The falling-off in building-activity throughout the East, is likely to bring about, in a measure, a decided weakness in prices, but it is a question whether any benefit will result. The opinions of builders and architects vary as to the extent of the reduction in building activity this season. in the six New England States ; it is placed variously, at 10 to 15 per cent; some authorities even naming 20 per cent. In New York State, the decline is estimated at 25 to 40 per cent, some even placing it as high as 50 per cent. In New York City, a better condition of things is reported. Most kinds of building material are declining ; the supply of brick is far above the demand ; plaster and cement are very low, but manufacturers continue production, in the hope that a heavy demand will relieve them next season. Nails have reached the lowest point touched for several years. Good nails have sold at New York and Boston, at $1.75. Laths are also very low, while lumber maintains its average quotations, under a good steady demand. The reason for this is, that Western markets have been absorbing enormous quantities of white and yellow pine, leaving comparatively less for the Eastern markets. Builders of high repute, and whose opinions are worth quoting, give it out unreservedly, that a reaction will take place in New England and New York next year, and the reasons they assign, although they are based mainly on faith, are in all probability correct. Capitalists and financiers are anxious to make liberal investments and improvements, but their course will depend largely upon the margin of profit which is likely to be realized. Abundant crops will assist. Farther West, a better condition of things is found ; builders have been very well employed all this season. A good many who found employment scarce in the larger cities in the Spring, sought and found work in the smaller cities and towns throughout the interior. A great deal of work has been quietly progressing, which the trade and daily journals have entirely overlooked. Towns have been springing up all along the lines of nearly all roads between Pennsylvania and Missouri. Kansas has been doing very well in several of its larger towns ; certain sections of Missouri have been active ; in others, but little progress has been made. In Colorado, Montana and Washington Territory, there has been great activity, especially in railroad construction. Washington Territory promises to attract a great deal of both foreign and American capital next year. Montana also is opening up opportunities for enterprise. Railroad construction in the Southwest will be actively pushed. British capitalists are interesting themselves in railroad schemes, and are anxious to prosecute their work early in the Spring, even against the prudent counsels of American advisers, in favor of delay. The iron trade is improving, throughout the country, but the full volume of demand will not be presented until the elements of uncertainty are removed. The lumber trade, as above stated, is very active in the West, and fairly so in the East. Between 30 and 40 saw mills are now being erected along the South Atlantic Coast. Industrial activity in the South still continues, and there is as much projected work this September as there has been in any month in the year. The returns to capital in textile enterprises, in mining, and in the larger manufacturing establishments of all kinds, are such as to encourage additional capital to enter into the same channels of activity. Speculators are able to earn but a poor living at this time. Their most strenuous efforts fail to attract the "sheep" into Wall Street A boom in railway stocks is almost an impossibility. Speculative talent will probably have but little employment in the next few months. Values are too well understood ; the earning capacity of railroads is thrown before the eyes of the public so frequently and thoroughly, that there is but little room for investors to force up values by any kind of false figuring. There is, however, a wide field for those who are interested in getting up corners, and there is danger from this source despite the intelligence and alertness of the public. Unpopular as it may be to assert the fact, the growth of trusts at this time, is a sort of necessity ; and no legislation, State or National, can do more than to make the managers of these colossal combinations very careful how they proceed. Without theorizing on the subject, it must be briefly stated that the enormous productive capacity of the country requires some form of control beyond that created by old trade associations and organizations. Existing commercial and industrial conditions are beyond the reach of old methods ; the growth of trusts may, for the present, threaten prices, and promise great profits to the managers of them ; but the influences at work within them, and which are sure to follow their growth, will protect the people from harm. This assertion is susceptible of demonstration ; and such demonstration occurs to the intelligence of many of those who are now crying out against them. For all that, the trusts themselves are not organized for any charitable purposes, but will devour all they can of what comes within their reach. They will be unable to gratify any large proportion of their desires. The shops, mills and factories are adding daily to their labor force, and orders are daily increasing for supplies for immediate, and also for winter delivery. No industry is in a dangerous condition. A healthy industrial activity for 1889 is assured in the continuance of the low prices, which the competition of the past months has established. The only improvement in prices will be the withdrawal of the very lowest quotations that hard-pressed merchants and manufacturers have made for the sake of business. Apart from that, there will be neither advance nor decline. There will be very little anticipation of want by consumers, because they have confidence that the productive capacity of the country is sufficient to supply all wants as fast as they may legitimately arise.

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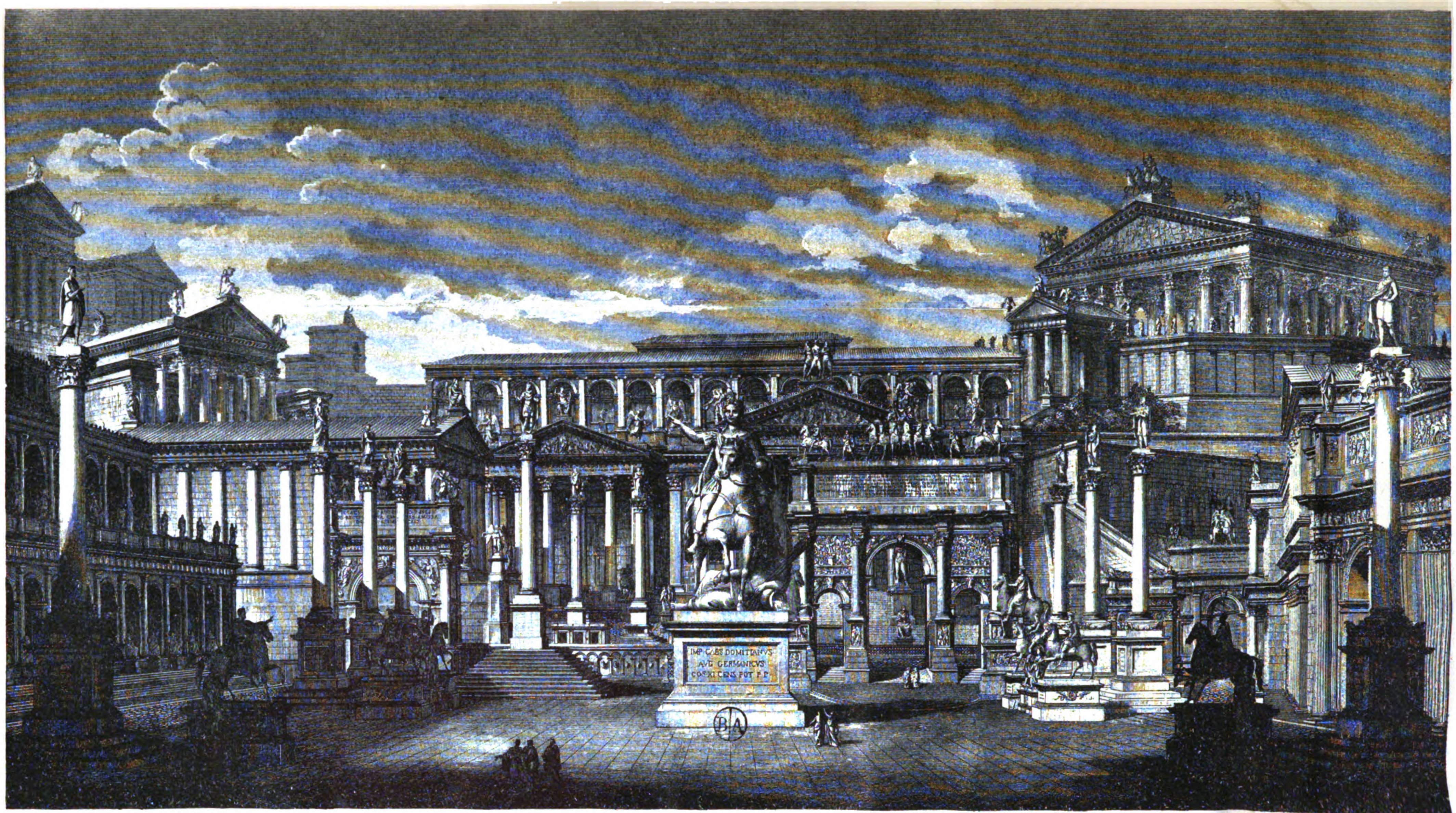

EDIFIZJ DELL'ARCE CAPITOLINA — TEMPIO DI GIOVE TONANTE — TEMPIO DI SATVRNO — ARCO DI TIBERIO — BASILICA GIVLIA — TEMPIO DI VESPASIANO — COLONNA DI FOCA — PORTICO CAPITOLINO DEL TABVLARIO — ROSTRI PROPRJ DEL FORO — CAVALLO DI DOMIZIANO — TEMPIO DELLA CONCORDIA — ARCO DI SETTIMIO SEVERO — CARCERE MAMERTINO — TEMPIO DI GIOVE CAPITOLINO — BASILICA EMILIA

At laterum passus hinc Iulia tecta tuentur,
Illinc belligeri sublimis regia Pauli
Terga pater, blandoque videt Concordia vultu.

ESPOSIZIONE DELL'ANTICO FORO ROMANO QVALE VEDEVASI DAL TEMPIO DEL DIVO GIVLIO CIOÈ DAI ROSTRI GIVLI

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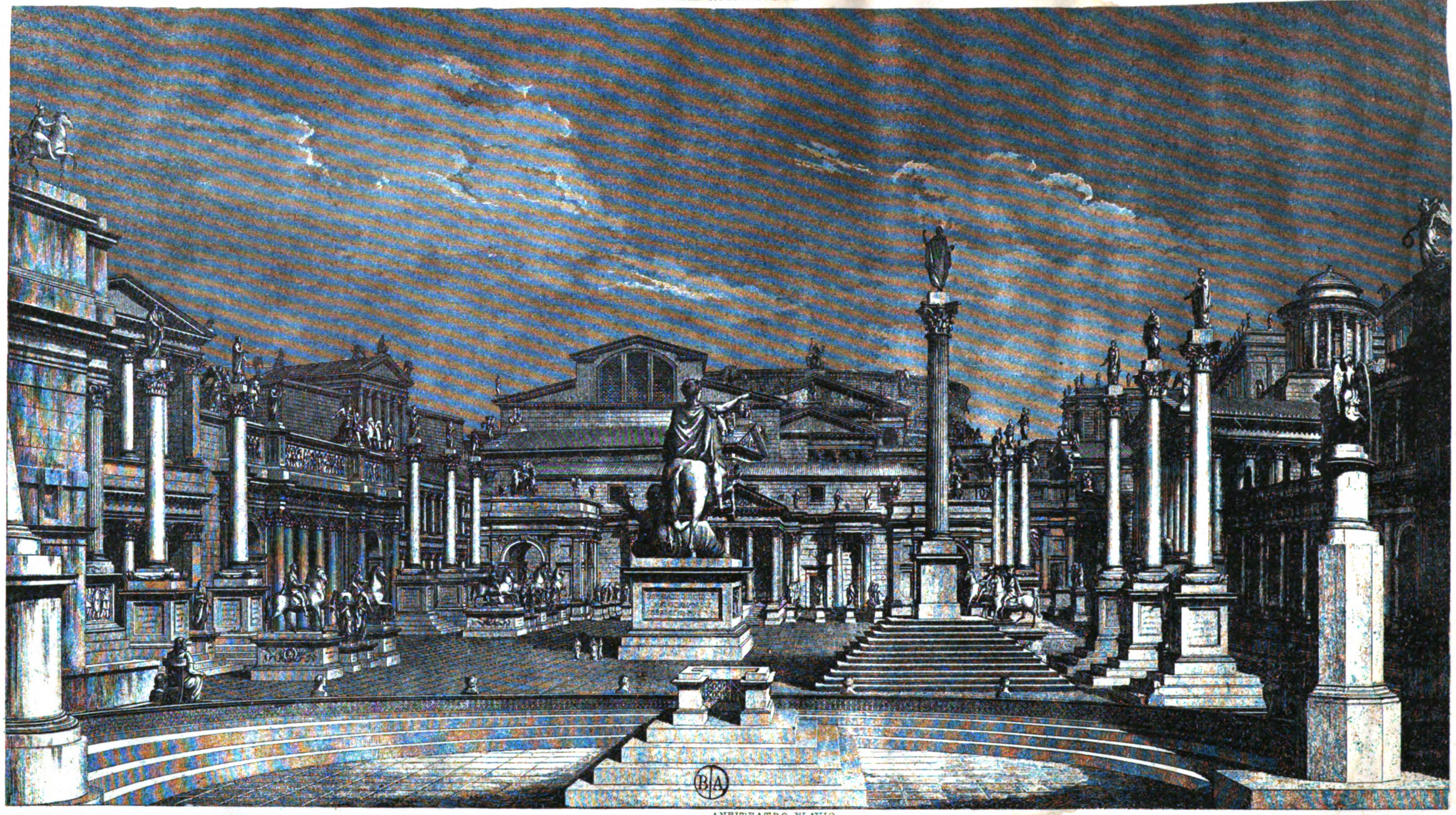

ANFITEATRO FLAVIO
TEMPIO DI VENERE E ROMA
BASILICA DI COSTANTINO
TEMPIO DI ANTONINO E FAVSTINA
BASILICA FVLVIA
TEMPIO DI GIVLIO CESARE
CAVALLO DI DOMIZIANO
EDIFIZJ DEL PALATINO SOPRASTANTI
AL TEMPIO DI VESTA
BASILICA EMILIA
STAZIONI DEI MVNICIPI
ARCO DI TITO
CVRIA GIVLIA
BASILICA GIVLIA
ARCO DI SETTIMIO SEVERO
COLONNA DI FOCA
ARCO DI TIBERIO
MILLIARIO AVREO

Primus iter nostris ostendit in aethera Divis.

An nova contemptis surgant Pallatia flammis
Pulchrius, an tacita vigilet face Troicus ignis
Atque exploratas iam laudet Vesta ministras

ESPOSIZIONE DELL' ANTICO FORO ROMANO

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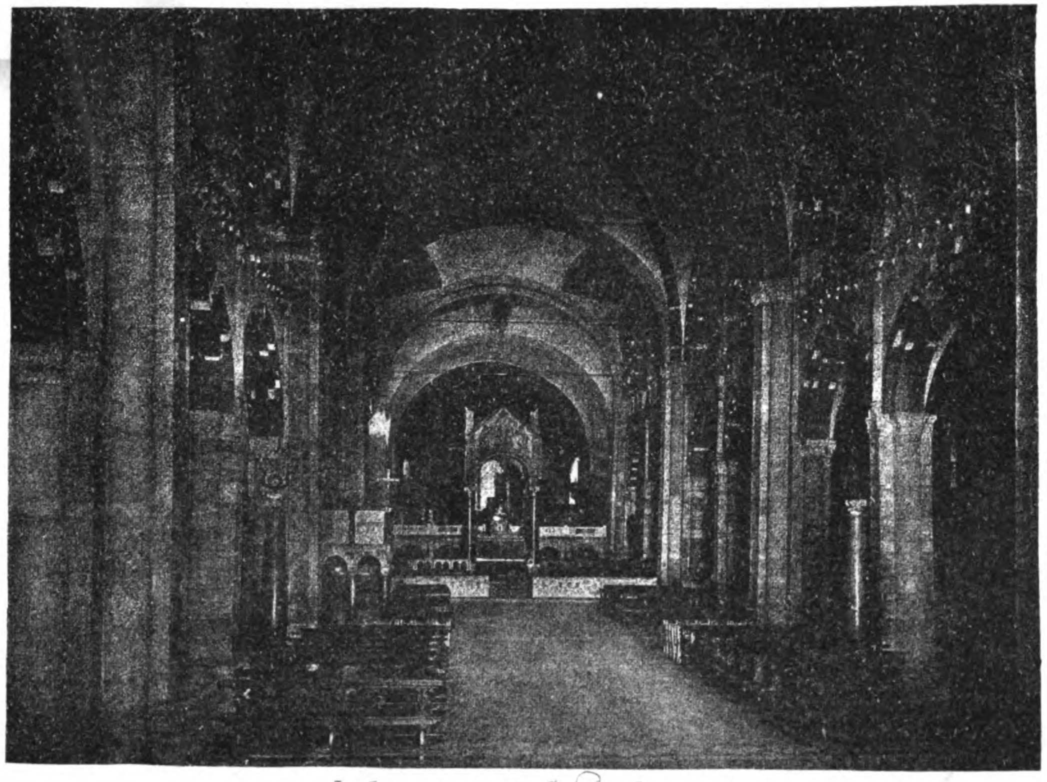
Panorama



Interior of S. Ambrogio

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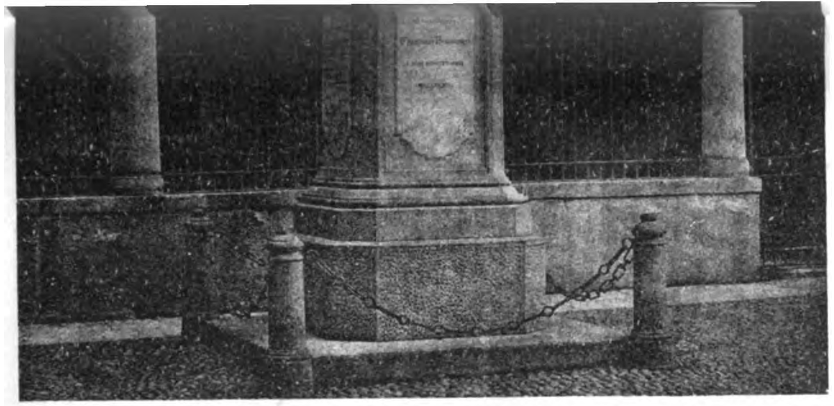
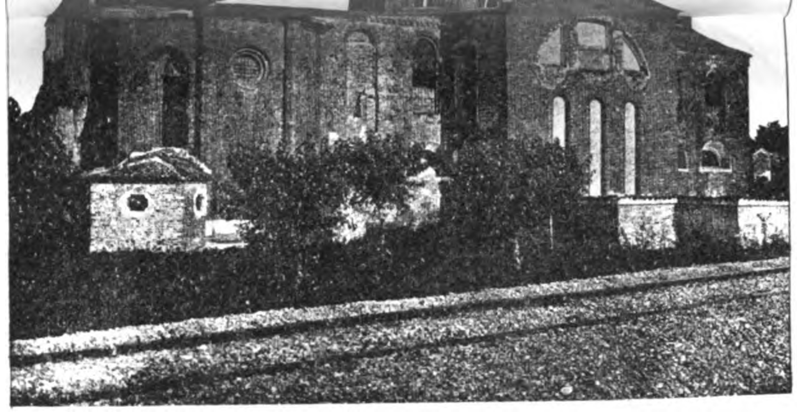
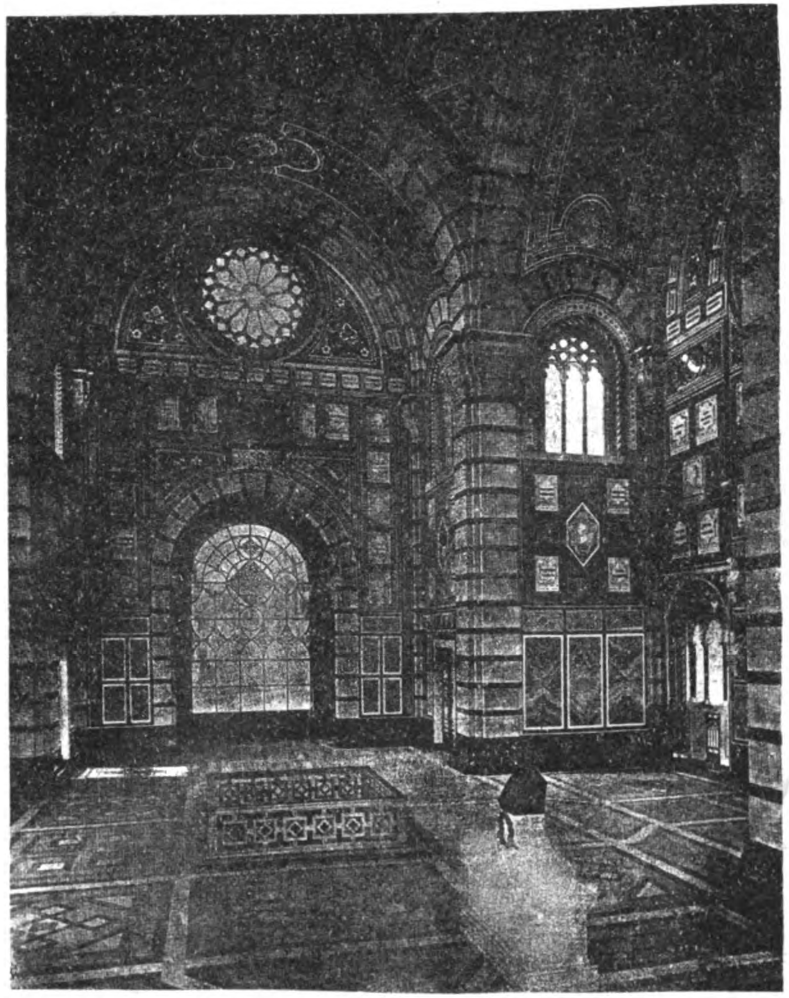


Frederic Borromeo



Abbey at Chiaravalle

S. Maria presso San Celso.



Interior of Crematory.

VIEWS IN MILAN

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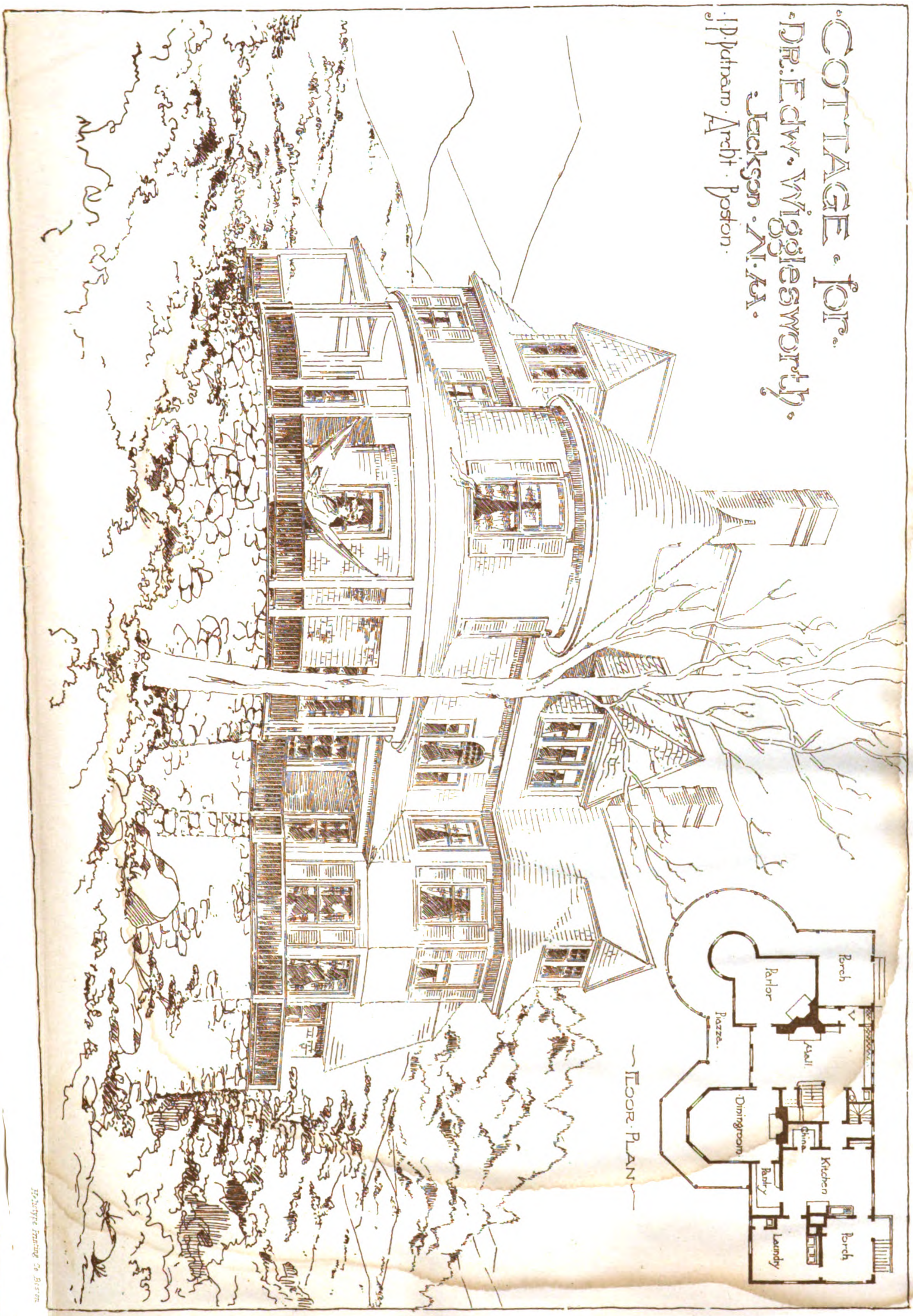

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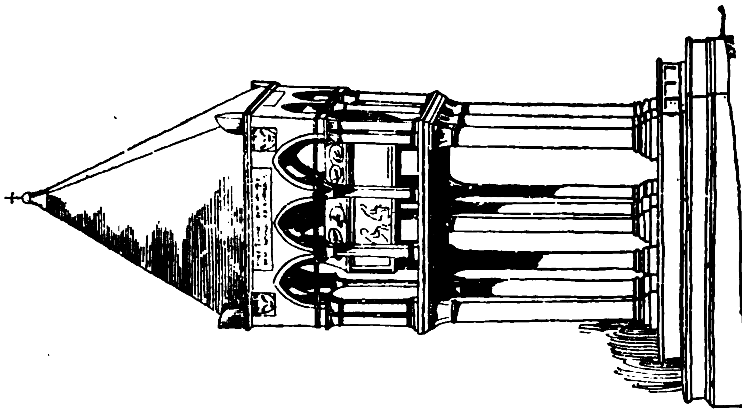
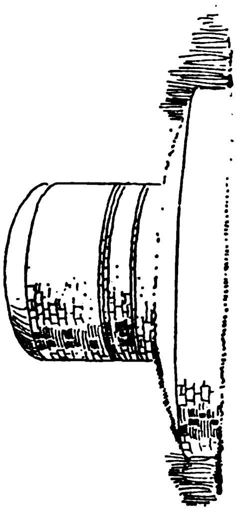
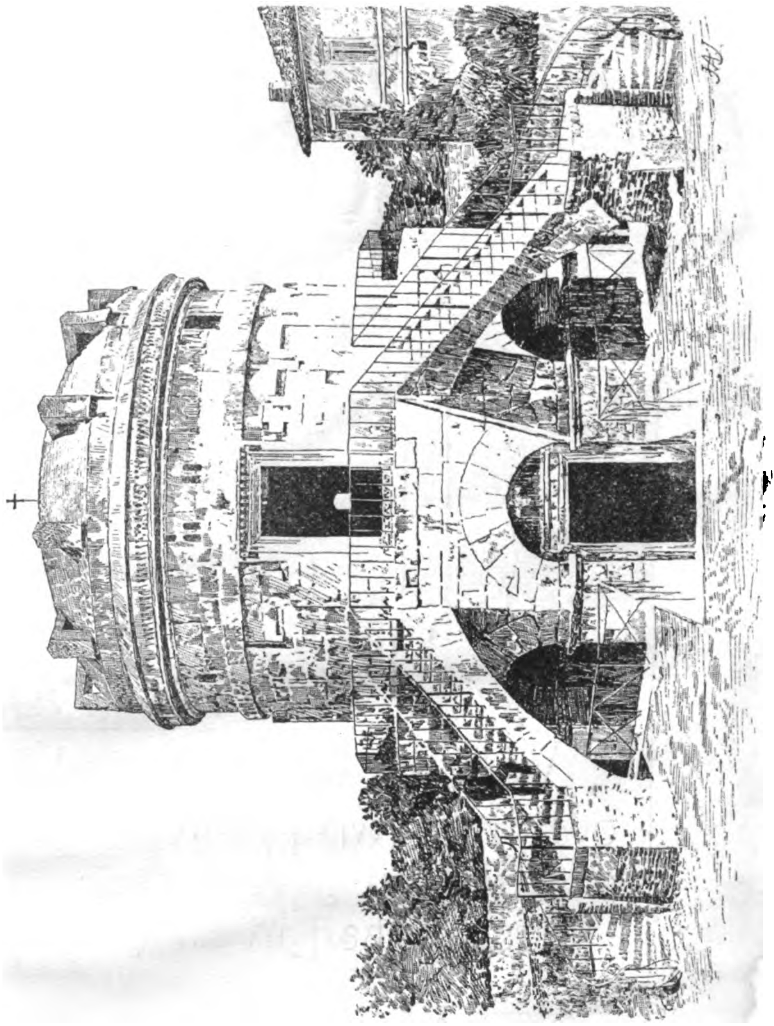
TOMBS.



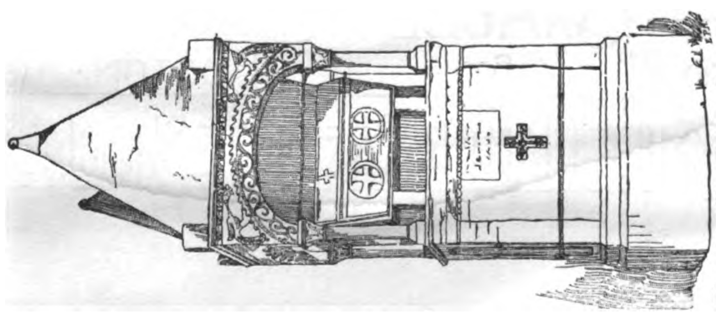
Tomb of the Passageri, Bologna.



Common Form of Indian Tope.



Tomb of Theodoric, Ravenna, Italy.



Tomb of the Foscherari, Bologna.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIV. No. 665.

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SEPTEMBER 22, 1888.

Entered at the Post-Office at Boston as second-class matter.

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THE report of the Commission of Inquiry, appointed to examine into the circumstances which led to the fall of the tower of the new Church of the Covenant in Washington, two or three weeks ago, has just been made public. The Commissioners, who are all experts, commend the general design of the tower, in which, as they say, the various pressures and resistances were carefully ascertained and provided for, but condemn the workmanship, and a part of the materials used. The specifications called for rubble foundations, and for dressed-stone facings to the superstructure, backed with rubble, "well bonded," "tied to the ashlar face with galvanized-iron clamps wherever necessary or expedient," and laid in mortar made of "the best Rosendale cement," and a certain proportion of lime and sand. Instead of complying with these requirements, the contractor built the rubble-work mostly of small stones, or rather, as the Commissioners say, of "shapeless chunks and chips," "very badly bonded," tied only at rare intervals to the facing, and laid in mortar which was "practically worthless." The foundation walls were only four inches thicker than those of the superstructure, and built in the same way. The conclusion reached by the Commissioners is that the fall of the tower was caused by the badness of the masonry, and this they lay mainly to the contractor, but think that the architects were at fault in providing in their specifications for the use of any lime whatever in the mortar, for not designing the foundation-walls thicker, and for not having watched the work more closely.

WHAT were the relative proportions of lime and cement specified for the backing we do not learn from the report, but the requirements for the mortar in which the facing was to be laid were that only sufficient lime should be used with the cement "to make the mortar easily workable." Analysis showed that all the mortar, for facing and backing alike, actually contained about one part cement to two parts lime, but it was all of such wretched quality that hardly any two stones in the ruins adhere together, and the mortar is mostly in the condition of sand. Although the Commissioners make some judicious remarks about the mortar, calling attention particularly to the fact, which is not always remembered by architects, and is still less frequently thought of by builders, that the mortar "is the great dependence for strength in rubble masonry," we are unable to agree entirely with them that no lime ought to have been used in the work. The mortar for the church appears to have been made with bad lime and worse cement, and we all know that some Rosendale cement is so very bad that, as the Commissioners say in this case, its use adds nothing to the strength of the mortar; but with good Rosendale cement, and good lime, we have General Gillmore's high authority for saying that "the addition of lime to the cement, up to a proportion of equal parts of lime and cement, does not materially injure the mortar;" while, with any quick-setting Rosendale cement, in the climate of Washington in summer, it would, we should say, be often necessary to add lime to the cement to prevent it from setting in the tubs before it could be used. As to the foundation-walls, the Commissioners say that they would have been sufficient, if laid according to the specifications, but they think that the architects ought to have presumed that the contractor would not keep his promises, and to have provided a wider "margin of safety" by making them thicker.

AT the end of the report, the Commissioners say that it appears that "largely for want of the intelligent supervision required of the architects, the contractor's materials and workmanship were inferior and unsuitable," and that "therefore the beautiful tower fell," and they say elsewhere that the "deplorable results were due in a great measure to an entire absence of any continuous personal direction, supervision or inspection by the architects or their representatives, other than some occasional visits, for a few hours or a day each, at intervals of some six weeks;" yet in almost their closing sentence they say that "in form and dimensions the tower furnishes a thoroughly substantial and permanent structure, needing but the simplest kind of good materials and workmanship for its proper erection." These two sentences illustrate with unusual force the standing controversy between architects on one side, and builders and owners on the other, in this country, which is every day becoming more serious for our profession. To take what architects consider to be the obvious view of the case, the report states that the architects of the church did the work they engaged to do thoroughly, skilfully and conscientiously; while the contractor deliberately broke his solemn promises, and slurred and neglected his work until the tower fell down, yet the Commissioners leave him gleefully slapping his pockets, in which he has safe the money which he gained by not doing what he was paid to do, and say that they think the "deplorable results" of his performances are "largely due" to the architects, every one of whose wise and skilful directions he intentionally disobeyed. Most architects, we are sure, regard conclusions of this kind as monstrous, and consider it too obvious for argument that the person to blame for not doing what he promised to do is the person himself; and that the individual who ought to restore stolen goods is the one who stole them; yet in building matters the great mass of mankind think with the Commissioners that if a contractor succeeds in pocketing as profit half the amount of his contract by the simple process of not doing what he agreed to do, it is the architect, not he, who is to blame. The ordinary sentiment is in this case well expressed by an editorial note in the Washington *Star*, which says that "in the mind of intelligent and disinterested persons there can scarcely exist a doubt that the architect is the one who must, primarily and finally, be held accountable, both morally and legally." In other words, according to our interpretation of his remarks, the editor of the *Star* thinks that the man who was paid for building the tower properly, and did not do it, ought to be allowed to keep the money, while the man who prepared good and skilful plans and specifications for it is the one who ought to make good the damage incurred because his specifications were not followed. That the architect was paid a small sum for "general supervision" of the work does not, in the professional mind, alter the case at all, for the reason that he knows that it is absolutely impossible for any architect, in the visits of supervision usually made, to detect a hundredth part of the contractor's omissions and mistakes, any one of which may prove fatal to the building, and he cannot conceive that any sane man should expect him to do so; but, on the other hand, the public generally assumes that by paying the architect a tiny fee he becomes individually responsible for all the contractor's work, and can be called upon at any

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time to make good the contractor's omissions, at his own expense.

So far as this country is concerned, the latter idea is altogether too well founded for the good of our profession. Although, if an architect exercises "due diligence" in supervising work under his charge, he is exonerated from liability on account of the contractor's failure to follow the specifications, it is far otherwise if he is found to have neglected that "due diligence" which a jury may find to have been required under the circumstances. In that case, although the contractor is clearly the person at fault, the law in this country is that the owner may, if he chooses, recover damages in full from the architect, leaving the latter to get reimbursement from the contractor, the real person at fault, if he can. If there were any standard of the due diligence required of the architect, it might be possible to arrange a *modus vivendi* between the architect and the owner which should provide a mutual understanding and complete security for both, but there is in this country nothing of the kind, and American architects are in constant danger of being ruined by any vicious client who may choose to accuse them of being the cause of his disputes with his contractors. It is quite time that this danger, which presses upon responsible architects with a rigor unknown in any other profession, should be removed, and it might easily be so. In all other civilized countries the architect is presumed to need most of his time for designing or directing in his office, and a clerk-of-works, or "*inspecteur des travaux*," is always provided, at the expense of his client, to watch the workmen from day to day, see to the mortar-mixing, report to the architect, and, in general, to do just what would have served, in the case of the Washington church, to detect the bad work in time to have it pulled down and done over again. Here, on the contrary, most architects are their own clerks-of-works, and are compelled in consequence to devote themselves, for fear of the terrible penalties which may punish a few days absence, to unremitting toil, while their more fortunate neighbors, the doctors, lawyers and merchants, are enjoying vacations all about them. Occasionally an architect is found who refuses to submit to such a burden. The late Mr. Richardson generally demanded, and received, two and one-half per cent in addition to the regular five per cent on the cost of the building, in cases where his clients wished for more careful supervision than that which would be given in a monthly or bi-monthly visit; and it is not very unusual in the large cities for architects to call upon their clients to furnish clerks-of-works, to keep up the minute daily supervision which they do not consider it their own duty to furnish. There is no question that they are right. It is for no one's real advantage that the architect, the planner, the designer, and the deviser of methods of construction, should be compelled to waste his time day after day in seeing mortar mixed, or bricks laid, so as to be sure of the exact quality of the work, nor can any architect pay half his commission to some one to do it for him. If architects are to be bound to supervision of this sort, they must be paid for it; if not, it must be generally understood that their clients, if they desire it, must furnish it themselves. There ought to be no great difficulty in getting this understood, and acquiesced in, by the public, and it would not be, perhaps, too soon for the Conventions of October and November to take up the subject.

We suppose that the American Public Health Association wishes for nothing more earnestly than as full a discussion as possible of the subjects to which it gives its attention, and we therefore make no apology for commenting, and inviting comments from other people upon certain matters which we find in its prize essay upon "Building a Home," by Professor Vaughan of Michigan University. After some very judicious remarks on soil and situation, Professor Vaughan gives a chapter on Cellars, which is too brief to contain all the exceptions to its rules that might with advantage be noted. The first rule is that all cellar walls ought to be "air and water tight," and this quality is to be secured by filling in a foot of "gravel or clay" all around them. If the foundation-walls are of brick, a "thin outer wall" is to be built, "two or three inches from the main wall, and the floor is in all cases to be made of concrete about six inches thick covered with Portland cement or asphalt." That such a construction will be expensive, Professor Vaughan admits, but he thinks that it should be insisted upon, "even if it becomes necessary, on account of increased cost, to deprive the superstructure of some of its ornamentation." How many jig-sawed brackets it would be necessary to dispense with in the cornice to pay for such a cellar as his essay demands, Professor Vaughan does not say, and we doubt whether he has made an accurate estimate of them. If he had done so, it is hardly likely that he would have seriously proposed a structure of that sort as the only one suitable for the dwelling of persons of the class to which the essay is addressed.

In regard to the "perfectly water and air tight" cellar walls we suppose that the recommendation of the essay is intended to be taken with a liberal allowance, the cost of a cellar wall really water-tight, enclosing a given area, being not much less than that of an ordinary complete house covering the same area. Regarding this, however, as meaning simply that the wall should be laid in cement mortar, without more than the usual proportion of void spaces, we next meet, in the recommendation that a space of a foot around the walls should be filled "with gravel or clay," a self-contradictory rule, which needs explanation. It is hardly necessary for architects to point out that gravel and clay, as filling materials, are of opposite nature, and that where gravel filling is useful clay is objectionable, and *vice versa*, but the essay tells us nothing of the way in which the kind best suited to the circumstances can be selected, nor of the importance, in case cellar walls in clayey or marly ground are surrounded with gravel, of providing an outfall below the level of the cellar floor for the water which will collect in the gravelly envelope. Without this, the porous mass will fill, after heavy rains, with water, which, hemmed in by the impervious earth outside, can escape only into the cellar, and usually does so, while a clay filling, although it protects the walls against moisture coming from beyond, is itself generally cold and wet, and keeps the adjoining stonework damp. Our own idea is that a filling of gravel or cinders is always to be preferred, on the condition, however, that unless the soil beyond it is very porous, the water which runs in stormy weather down the sides of the house, and sinks into the gravel, shall be received, below the level of the cellar bottom, into a pipe or stone drain large enough to carry it off rapidly to some proper outfall. Under this arrangement the air circulates outside the cellar walls as well as inside, to their great advantage. Of the more artificial method of promoting dryness, by building a thin screen-wall of brick outside the main foundation, we must confess to having a poor opinion. Unless defended by a filling of gravel or cinders, well drained, so that water could not collect in it, such a screen-wall would, in the climate of our Northern States, be torn to pieces after a few winters, while in any climate and under any circumstances it is liable to be crushed by the pressure of earth against it, and to allow water standing in the ground outside of it to come through and fill the air-space between it and the main wall. If, however, Professor Vaughan's ideal of a cellar wall is ill adapted to the use of modest householders, his model of a cellar floor is hardly better. While six inches of concrete is well enough for the floor of a costly building, three inches of good concrete on a suitable foundation gives a floor sufficiently hard for any ordinary dwelling-house and nearly as impervious to ground air as a six-inch stratum. Neither is, however, entirely impervious, and nothing but asphalt will make it so, but the cost of this, amounting to about two hundred dollars for a small house, is so great as to make it practically unavailable. In fact, the equipment of a cellar with six-inch concrete floor, with asphalt over it, and screen-walls outside, would add from five hundred to a thousand dollars to the cost of the house, without any great corresponding advantage. In regard to keeping ground air out of the cellar, a three-inch floor of concrete without asphalt will repel air better than an ordinary stone wall, and there seems to us to be little use in asphalting the floor unless the walls are also made air-proof by "boxing," or lining with asphalt at an immense expense. A good deal may be done cheaply to make the side walls of the cellar air-tight by painting them on the outside with hot coal-tar, and in certain cities, where the ground is polluted by cesspools, this is very useful, but the most reliable of all devices is to have the cellar windows large and keep them open, and if this is faithfully done and water prevented by proper drains from ever entering the cellar, as much has been accomplished as can be hoped for in the basements of workingmen's dwellings.

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BUILDERS' HARDWARE.[1] — VII.

HINGES. — HASPS AND STAPLES.

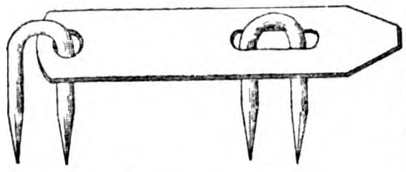

Fig. 59. Hasp and Staples.

WROUGHT-IRON hasps and staples are not properly to be classed with hinges, but it seems convenient to introduce them at this point. Ordinary wrought-iron staples are made in thirteen sizes, from one inch to six inches long. They are made both in plain and galvanized iron and are used in building operations chiefly in connection with wrought-iron hasps. Figure 59 shows the commonest form, a plain hasp with two staples. Hasps are made in even inches from five to twelve inches in length. A variation from the common hasp has a latch on the hasp which catches into one of the staples in place of a padlock, as shown by Figure 60. A natural simplification of this devise is to do away with the hasp, connecting the staples by a wrought-iron hook, the staples being either driven independently, as in the previous examples, or riveted to plates, as shown by Figure 61. There is also a form of hasp and staple intended to be secured with a padlock, the locking-staple being swivelled on a back-plate which is screwed to the jamb.

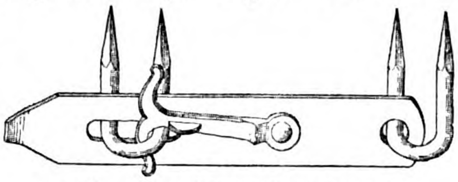

Fig. 60. Hasp and Staple with Double Hook.

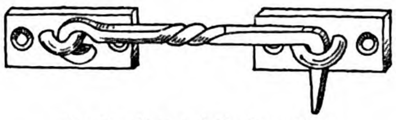

Fig. 61. Hasp and Staple on plates.

In place of the ordinary wrought-iron hasp and staple, Figure 59, hasps are made bent at right angles at the middle so as to lap around the edge of a box or a door, if necessary. Bent hasps can be had in the market from five to ten inches in length. Besides this, there are numerous special forms which are made by a few manufacturers, and as hasps are always of wrought iron or steel, they can be bent to any desired shape.

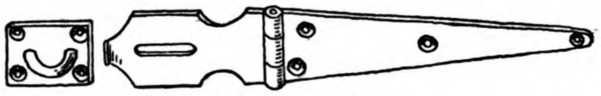

Fig. 62. Hinged Hasp.

The connection between hasps and hinges can be readily illustrated by Figure 62, representing a hinged hasp. This is a natural outcome from the common hasp and staple, the hasp being hinged in the middle, one end screwed onto the door or box-top, while the other end has a slot through which is passed a staple for securing the padlock. The figure shows one of these, with an ordinary staple attached to a wall-plate. They are also manufactured with swivelled staples. These hinged hasps are made three, four and-one-half, six, eight, ten and twelve inches long. The price is the same for either the plain or the swivelled staples. Some manufacturers have in the market varieties of hinged hasps made in brass or bronze for fancy work. These are, however, not used very extensively, and the form is more strictly for rough work.

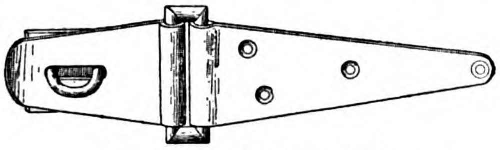

Fig. 63. Solid Link Hinged Hasp.

A form of hinge-hasp shown by Figure 63 is sometimes used for extra-heavy work, and for trap-doors. In this, the hasp works upon a solid link of wrought-iron, and considerable gain of strength is so acquired.

STRAP–HINGES.

Hinges, proper, may be divided into two general classes: First, those which are placed on the face of a door or shutter, and are known as strap-hinges; and second, those which are mortised into the butt edge of the door and against the frame, and are, consequently, designated as butts. Figure 64 shows the commonest form of a strap-hinge, such as is seen on barn-doors, etc. These hinges are made in even sizes from three to sixteen inches long, measured when opened flat. They are made in various ways and widths to suit special necessities. A variety of strap-hinge is made by the Stanley Works, with the same sort of solid link that has been described for Figure 63. This form of hinge can be used only where there is plenty of room both on the door and on the jamb for attaching the leaves of the hinges. When the width on the jamb is restricted, as is often the case, a T-hinge, Figure 65, is used. In some cases it is necessary to have the fixed plate bent, a form known as the chest-hinge being then used, Figure 66. The latter costs considerably more than the common form. The T-hinges are about the same price as the ordinary strap-hinge. The Stanley Works manufactures a T-hinge with a braced leaf, which is very useful in some cases. This is shown by Figure 67.

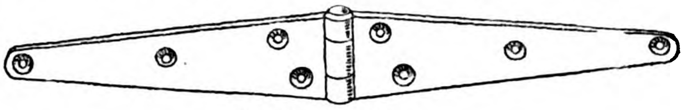

Fig. 64. Strap-Hinge.

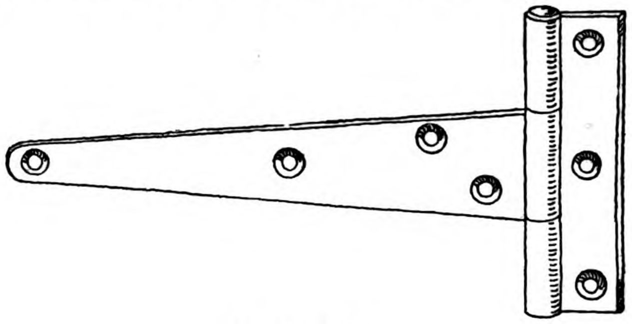

Fig. 65. T-hinge.

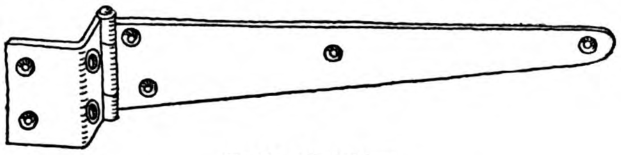

Fig. 66. Chest-Hinge.

There are several special makes of strap and T hinges, which are reinforced so as to afford greater strength. One of these is the Wells patent hinge, Figure 68, in which the metal of each leaf of the hinge is carried completely around the bend and back onto itself, so that it would be almost impossible to tear it away. The Hart patent hinge is reinforced by a double thickness of metal about the pin, and the Record hinge is strengthened by two flange-plates, which are bolted to each leaf and attached to the pin, as shown by Figure 69. The prices of these reinforced hinges are the same for the different kinds.

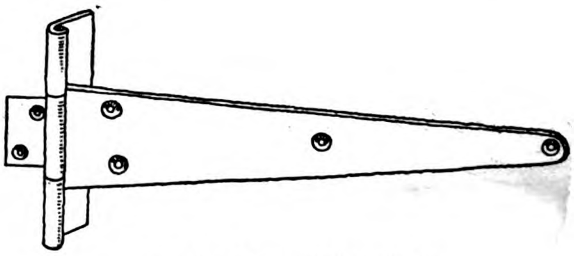

Fig. 67. T-hinge with braced Leaf.

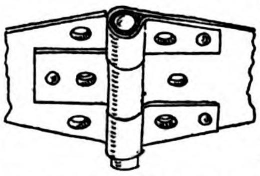

Fig. 68. Wells Patent Hinge.

Figure 70 shows a hinge which is used when it is desired that the pin should be well out from the door or shutter, so as to throw it open away from the jamb. This hinge is made in sizes from six to eighteen inches long.

The following table gives the average retail prices of the foregoing hinges, in a few of the leading sizes.

[1] Continued from No. 664, page 120.

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TABLE OF WROUGHT-STEEL STRAP-HINGES.

Prices per dozen pairs.

Fig.	NAME.	3 inch.	6 inch.	10 inch.	12 inch.	16 inch.
		$	$	$	$	$
59	Hasp and staple	....	.55	1.00	1.53	....
60	Hasp and staple with double hook	....	.56	1.00	1.54	....
61	Hook and staples on plate[1]	1.20	....	....	....	....
	Hasp and staple with swivel staple	....	.91	1.54	....	....
62	Hinged hasp	.96	1.24	2.61	3.85	....
63	Solid-link hinged hasp	....	8 inch.[3]	....	....	....
64	Strap-hinge[2]	.50	1.35	1.75	3.00	4.50
65	T-hinge	.50	.75	1.20	1.88	....
66	Chest-hinge	....	.88	1.25	1.50	....
67	T-hinge with braced leaf	....	....	1.79	2.75	....
68	Wells's patent hinge	....	2.10	4.95	7.05	....
	Hart's patent hinge	....	2,10	4.95	7.05	....
69	Record's patent hinge	....	2.10	4.95	7.05	....
70	Raised strap-hinge	....	....	2.63	2.95	4.25

[1] These are made as small as ½ inch.
[2] Prices given are for light strap-hinges. Heavy strap-hinges are sold by the pound at 12 to 14 cents.
[3] $6.60.

Figure 71 shows a special form of hinge manufactured for trap-doors, permitting the door to be hung from the under side, leaving the upper side free from obstruction, and flush with the

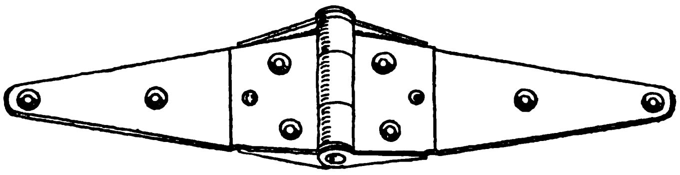

Fig. 69. Record's Patent Hinge.

floor, while at the same time the use of the full size of the trap can be had when the door is up: the hinges will hold the door in position. The working of this hinge will be seen by the figure. The retail price is $1 per pair. It is listed in the catalogues of several of the hardware manufacturers.

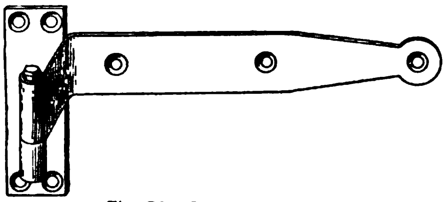

Fig. 70. Raised Strap-Hinge.

Figure 72 illustrates a species of rude hinge used quite

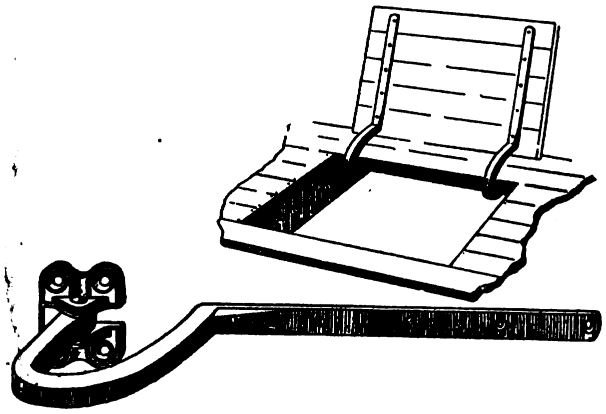

Fig. 71. Trap-door Hinge.

frequently for barn and warehouse doors, consisting of a hook to be driven into the door-post and a bar with an eye at the end to be bolted through the door. These are made of iron ½, ⅝, ¾, ⅞ and one inch thick, and are sold by the pound, and at 25 cents for ½ and ⅝ inch, and 20 cents for the other sizes.

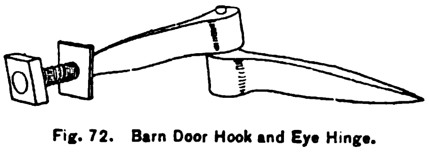

Fig. 72. Barn Door Hook and Eye Hinge.

BLIND-HINGES.

A variety of hinge which may not be called a strap-hinge, but which, nevertheless, partakes of its nature, is manufactured in a great many forms for outside blinds. The practice of hanging blinds differ in different parts of the country. In the vicinity of Boston the blinds are generally hung on the outside of the casing, and the hinges consist of a simple half hinge on the blind and a hook driven into the face of the casing. In New York the blinds are, almost invariably, set flush with the outside casing, requiring a different style of hinge. Throughout the West a number of forms of cast-iron hinges are used, which, in a measure, lock the blind when open or shut, as will be hereafter noticed. For blinds hung in the Boston fashion, the commonest way is simply to attach a half hinge to the blind, as previously stated. These half hinges are made in two sizes, two and two-and-one-half inch, costing $5 to $7 per hundred sets. They are mortised into the edge of the blind. If additional strength is required, a longer strap-hinge is used, which is screwed onto the face of the blind. There are various forms of these strap-hinges used for this purpose, all of which are too commonly known to require description. Another variety of the same kind of hinge is made so as to throw the blind well out from the casing and away from the moulding. These are made with a two-inch throw, and others with a four-inch throw are also in the market for use in connection with brick buildings.

For the blinds attached in the New York manner, some of the foregoing forms can be used, if the butts are set out sufficiently to clear the face mouldings of the frame, but generally

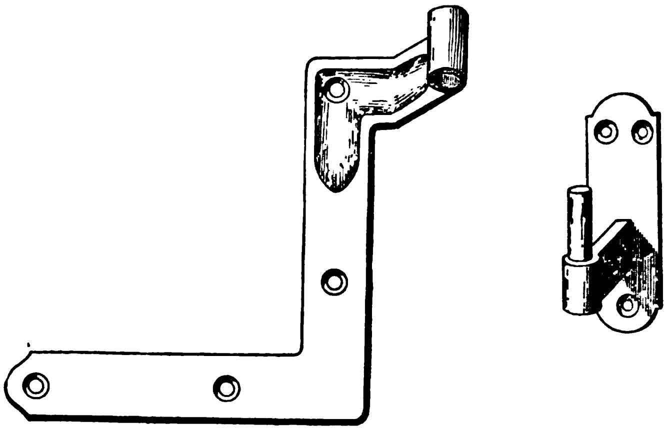

Fig. 73. Blind Hinges, New York Style.

speaking strap-hinges are used, in most cases, of the form shown by Figure 73, the strap, which is bent so as to strengthen the frame of the blind as well as support it, being secured both to the rail and the style. Instead of the hook shown by the figure, some form of drive hook is often used, and the hinge, instead of being bent, sometimes consists of a straight face-plate or strap. Figure 74 is a form of malleable-iron hinge used for blinds hung in the New York style.

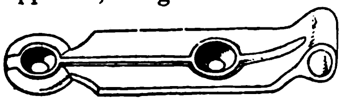

Fig. 74. Malleable Iron Blind Hinge.

The hooks which are used for blinds are mostly made of malleable-iron. There are several varieties. A plain hook to drive into the wood, shown by Figure 75, is made three and a half inches long with a shorter length of the same style for light blinds hung flush with the casing. Figure 76 shows what is designated as a drive brace. Figure 77 is a form sometimes used, an iron screw-hook; and Figure 78 is the most common form of screw brace.

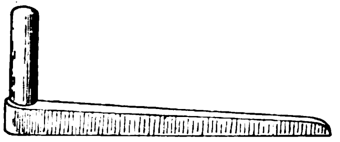

Fig. 75. Plain Drive Blind Hook.

The advantages of the styles of hinges previously described are that they are mostly made of wrought-iron and are not apt to break, while there is absolutely nothing to get out of order about them. The disadvantages are that they contain in themselves no principle which will hold the blind open or shut, and when it is secured in the ordinary way it takes considerable bending and twisting to close the blind after it is opened. To overcome these difficulties a number of forms have been devised, most of which are used more freely in the West than in the East. All of them are arranged to keep the blind from closing itself. They are generally made of malleable-iron, a feature which

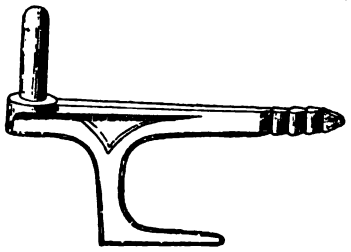

Fig. 76. Drive Brace Blind Hook.

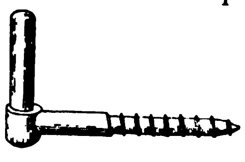

Fig. 77. Screw Blind Hook.

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would be an objection in the eyes of Eastern builders. One of the simplest forms is the Seymour hinge manufactured by P. & F. Corbin. Figure 79. The essential principle in this hinge includes a raised cone on the house hinge working into a socket on the blind hinge. The hinge is shown partially raised and in the position it takes when the blind is

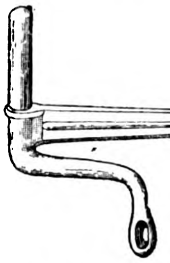


Fig. 78. Screw Brace Blind Hook.

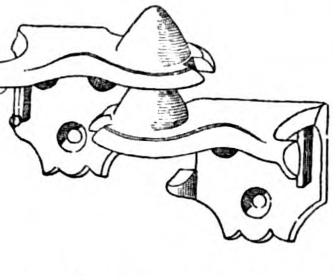


Fig. 79. Seymour's Blind Hinge.

closed. When the blind is thrown back a lip on the upper hinge catches on to a protection on the lower hinge and holds the blind firmly in place, so that it can be released only by raising the blind bodily.

The Shepard Hardware Co., of Buffalo, manufactures a number of varieties of window-blind hinges which are used quite extensively. All of them are double locking and arranged so that the blind can be lifted off the hinge only in one position, thus obviating any upsetting of the blind when trying to close it. Most of the Shepard hinges close by gravity when once raised; that is to say, the surfaces of the upper and lower hinge are bevelled so that the blind will slide down of its own weight and so close. Figure 80 shows one of the best of these hinges and illustrates also the manner in which it closes by

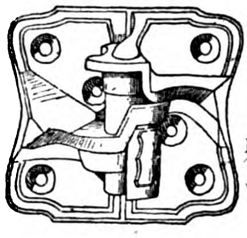


Fig. 80. Shepard's Noiseless Blind Hinge.

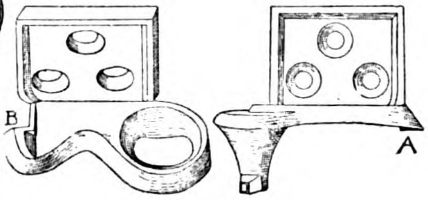


Fig. 81. Shepard's Standard Blind Hinge.

gravity. This hinge and nearly all of the Shepard make are planted on the face of the blind rather than mortised into the edges. A very simple form, and one quite good in its way is shown by Figure 81. The two parts of the hinges are shown separately so as to represent it more clearly. The fold on the right is attached to the blind and the hook rests in the socket of the other fold of this hinge. The bottom of the socket is contracted to an ellipse and by reason of the lug on the blind hook, the blind can be lifted off the hinges only when standing at right angles to the house. When the blind is open the lug *A* catches into *B* and hold the blind securely. In order to close the blind it is lifted bodily until the lug clears the catch. Figure 82 is another variety of the Shepard hinge which can be used in case the blind is set on the face of the casing, the two arms of the hinge being unequal in length. All of the Shepard goods are very nicely finished and seem like very durable and serviceable articles. There are many varieties but the foregoing will answer for the purposes of general illustration. They retail at ten cents per set, or fifteen cents with screws.

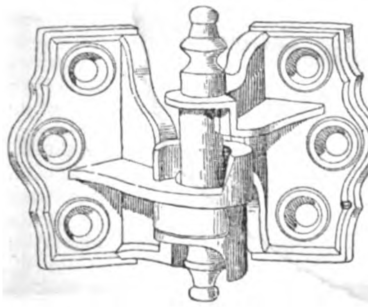
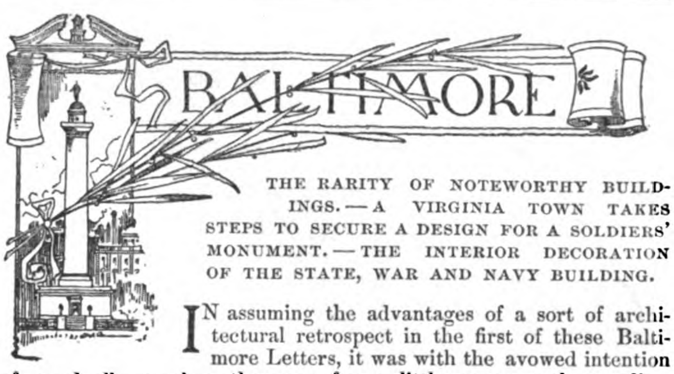


Fig. 82. Shepard's Gravity Blind Hinge.

[To be continued.]



THE RARITY OF NOTEWORTHY BUILDINGS. — A VIRGINIA TOWN TAKES STEPS TO SECURE A DESIGN FOR A SOLDIERS' MONUMENT. — THE INTERIOR DECORATION OF THE STATE, WAR AND NAVY BUILDING.

IN assuming the advantages of a sort of architectural retrospect in the first of these Baltimore Letters, it was with the avowed intention of gradually paving the way for a little more understanding and interest in the buildings of to-day, a looking-back into architectural pedigree, as it were, which has only gone to prove, alas! how and when whatever once existed of the "thoroughbred" has died out, and where the mongrel race came in. And although we also assumed at once the cheerful line of argument, and held desperately on to the thread of it — that we were gradually leading through a dark age to a more hopeful present and future — when we really come to lay our hand on the conspicuous buildings that have been erected in the last few years in other cities as well as in Baltimore, how very few there are, with some noted exceptions (that emanate from not more than half-a-dozen different offices), which, from an architectural point of view, have anything of a national interest, and, however imposing their dimensions may be, offer anything more than a re-arrangement of oft-used forms and decorative detail in an effort after novelty.

Here in Baltimore perhaps we had better frankly confess that this element is very strikingly apparent among noteworthy buildings lately erected or still under construction. We may cite Rennert's Hotel, the Eutaw Savings Bank, the Hutzler building, the Darby building and the Farmers' & Merchants' Bank; but, notwithstanding laudatory local criticism, we fail to find in any of these the character that would make them objects of more than local interest, or place them in the front ranks with the best work that is now being done throughout the country.

The Mercantile Trust and Deposit Building, from the special purpose for which it was designed, naturally acquired a certain character and interest, and has apparently attracted more than local attention, and its architects would doubtless be content with no further criticism upon it than that of a contemporary French architectural journal, lately translated in the pages of the *American Architect.* When we turn to the consideration of the dwelling-house design we find much the same conditions obtain; much has been rescued from the "vernacular," from the hand of the carpenter and builder, and the half-fledged architect, but, with one or two rare exceptions, nothing has been produced of marked intrinsic merit. The attempt at "Belvedere Terrace" to solve the question of the best arrangement for an eighteen or twenty foot house built in a row, produced the somewhat unusual result of an entire block, from Eager to Chase streets, being solidly built up on both sides, with an effort at a certain harmonious symmetry and balance in the whole length of the street-fronts, the two sides of the street being given to two different architectural firms to design, and the general effect of the whole block is decidedly above the average for houses of such moderate cost and dimensions. While that on the west side, as regards plan and interior arrangement, has met with general approval, and is far the more satisfactory of the two, we do not find that the evidently carefully-studied and somewhat academic design of its façade is any happier than the rather careless and accidental style of its opposite neighbor.

Such conspicuous buildings as the United States Post-Office, now nearly completed, and the great Hopkins Hospital, about to be opened, after a preparation of many years, call for a wider description and criticism in a later letter, so we may close this with a slight digression to an analogous subject that is not without a somewhat pathetically humorous side to it.

The erection and dedication of numerous commemorative monuments on the field of Gettysburg, on the occasion of the great celebration of July 3, suggests a recent incident, that would be amusing if it were not for the discouraging element in it as a typical illustration of the art-feeling in certain communities. A not very distant trans-Potomac town (we will not designate more closely) determining to erect a soldiers' monument within its own borders, and having appropriated some $4,000 for the purpose, applied to a well-known stone-mason in Baltimore for a design, apparently quite ignorant of, or wilfully ignoring the fact that such commissions were ever intrusted to those of more artistic training. The essential feature of the design was to be a full-length figure of a soldier raised upon a pedestal, the whole to be twenty-five feet high. The stone-mason, among the most prominent of his trade in the city, and a man of intelligence, somewhat doubting his power to grapple with the problem, wrote to a young architect in another part of the city asking *if he would kindly come to his stone-yard for about half an hour and give him a drawing* for the monument, and suggested the possibility of his taking the train that night for the purpose of submitting the

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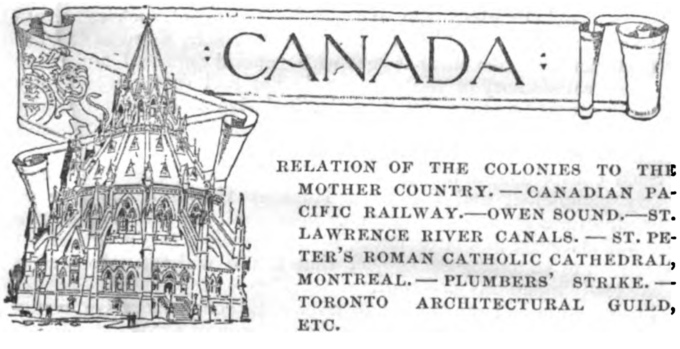
completed design to the approval of the impatient trans-Potomac art-patrons. The young architect, while thoroughly appreciating the absurdity of the transaction, did not happen to be in such a position that he was willing to refuse his services, when asked for any legitimate object that would sufficiently renumerate him, and having a certain capacity for effective sketching, by the aid of such models as he could immediately lay his hands upon, he produced a hastily conceived design to an inch scale, which, although he refused to undertake the further commission of bearing it to the art-committee and revealing to them its occult merits, met with unqualified admiration from the stone-mason. It was, however, duly submitted to the committee, and received with a very prudent reserve, non-committal of either approval or disfavor, and their future action has only been vaguely surmised by certain questions to the mason, which seem to suggest that he may only be required to furnish a pedestal for a "metallic" statue from a manufacturer who keeps them in stock. Under what different auspices was undertaken the somewhat analogous scheme of erecting monuments commemorating the battle-fields around Paris, after the Franco-Prussian war, may readily be seen by referring to the pages of "*L'Intime Club*," where are shown the numerous designs submitted for the purpose in competition by many of the leading architects of France; and as regards Gettysburg, we may feel that the probably numerous insults to art, resulting from most of the monuments erected there, are largely compensated for by the gain to the world of thought and literature in Mr. Curtis's grand oration on the occasion. While we are in the spirit of pessimistic criticism we are tempted to refer to a recently published article from a Washington correspondent, headed "An Artistic Building." The following extract is taken from a mass of elaborately detailed description of decoration, which (having some belligerent emblems) would seem to fittingly apply to the Hoffman House restaurant, perhaps, rather than to the State, War and Navy Building of a great nation. In redundant and superlative writing the author fairly rivals Mr. Rider Haggard in his own field of "the Horrible."

"Nearly fifty artists have been busily at work decorating the rooms in the new wing of the State, War and Navy Department Building, which are to be occupied by the Secretary of War, and the higher officers of the army. The result is a series of apartments which for richness of ornamentation cannot be equalled in this country. Nearly every color known to the painter's palette has been brought into requisition, and the designs being all original and appropriate have been prepared with an eye to rich and sumptuous effects. . . . Mr. Endicott's æsthetic Boston tastes will certainly be gratified when he enters these rooms. . . . they are gorgeous chambers. . . . The ceiling itself is almost covered with a wealth of frescoing in gorgeous colors. . . . No words can describe the effect which the highly-colored splendor of these rooms produce (*sic*) upon the visitor. . . . Another room on the same floor is a symphony in purple. . . . A little gem of a room in the third floor; its mantle is of red marble, and the dado is such a perfect imitation of the stone that it is hard to tell where the mantel ends and the painting begins. Thousands of dollars have been spent in beautifying these offices, and when completed each will be an art gallery in itself." Let us hope for the sake of our national art reputation, and also on account of their possibly dangerous influence upon our future war transactions, that these descriptions are not accurate.



CANADA

RELATION OF THE COLONIES TO THE MOTHER COUNTRY. — CANADIAN PACIFIC RAILWAY.—OWEN SOUND.—ST. LAWRENCE RIVER CANALS. — ST. PETER'S ROMAN CATHOLIC CATHEDRAL, MONTREAL. — PLUMBERS' STRIKE. — TORONTO ARCHITECTURAL GUILD, ETC.

A VERY able leader of the London *Standard* of nearly four years ago (December 27, 1884) pointed out how rapidly England was becoming a "Continental nation." England cannot be considered now, as it was in earlier times, "a group of islands, possessing great colonies and dependencies, which were either islands or surrounded, at least, by barbarians, which were easy to repel and only too easy to conquer." After saying that, "obeying the impulse which drove us to the establishment of colonies, not only one power, but all the great powers are rushing outwards from their own dominions in streams either of conquest or colonization which must come in contact with what we have hitherto considered as our natural development," the article goes on to show the result of this movement which is that the English have become next-door neighbors all over the world with one or another of the other powers. In India we have Russia on our very borders. In Austria and at the Cape Colony we find ourselves side by side with Germany. "Even without the question of colonization in Egypt, we are unquestionably face to face with France. She is establishing herself at the mouth of the Red Sea, and she calls all Europe to oppose English designs in Egypt." "If England holds certain detached fortresses in the Mediterranean, France is creeping around the mainland and endeavoring to turn the Southern waters of Europe into a French lake." It is then urged that the standards of both army and navy be raised, and the leader concludes by saying that "what we have to do as a nation is to grasp the idea that the future hope of Great Britain and her colonies lies in a frank acceptance of Imperial Federation established on a firm basis."

Four years have passed away and we see that this is more than ever the fact, and in no part of the empire is there a more important country, strategically, than Canada at this moment.

Recognizing the importance of the position that Canada must take as a portion of this "Continental nation," the Imperial Government though slow to act is setting about the task of preparing her to protect herself. The construction of fortifications, docks and harborage, the development of towns and villages as posts of communication and bases of supply along the line of that railway, which, crossing the Continent direct through British territory, forms such an important link in the chain connecting the mother country with the colonies of Asia and Polynesia — all these works bring men and materials, and the materials must be quarried or manufactured, transported and prepared, and so the country "goes ahead."

It is the gigantic enterprise of the Canadian Pacific Railway which has enhanced the value of Canada in the eyes of England, said the Hon. J. A. Chapleau, in his speech at Montreal (January, 1885). England has learned that Canada is no longer a child, but has reached maturity and can be made use of, and can make herself of use. The completion of the Canadian Pacific Railway has opened up a route by which in a Westerly direction, as well as in an Easterly, we have a highway to the East. Heretofore, the Easterly route, the Suez Canal, has been the only one, and it — a slender one at best, into the bargain, a silver thread on the face of the globe, but too easily snapped — a canal, than which nothing would be easier to obstruct and destroy, but of an importance to England of untold value. And so it has come to pass that a tide of increasing prosperity appears to have set in for Canada. Look where you will, all hands are engaged in the work of development. Strange, if a country of its possibilities should not ultimately be able to hold its own against all comers. The recent fisheries retaliation cry has done one good thing for Canada, it has made us open our eyes to the fact that we can do without the States; we can improve existing means of transit, engineering can overcome most difficulties, and, in fact, it would be rather an advantage to Canada if the threat were carried out. The action would quicken the work of developing the resources of the country.

I have said a good deal about Montreal and Toronto in former letters, but some of the lesser towns deserve remark. At the present moment Owen Sound stands out as an example. This enterprising little town of some 5,500 inhabitants, situated on the south shore of the Georgian Bay, east of Lake Huron, in most picturesque scenery, has long been used as a port, but now it is to become a great business centre. The Government has recently voted $15,000 for improvements (principally dredging works) to the harbor, and a request has been forwarded to the Department of Railways and Canals, that the stone from Owen Sound quarries may be used for the works of the Sault Ste. Marie Canal, another engineering work of great importance. The Grand Trunk Railway passes by Owen Sound at a distance of seventeen miles on one side and fifteen miles on the other, and efforts are being made to induce the Company to connect with the town on both sides, to give outlets in each direction.

Among the engineering works in progress may be mentioned the widening of the canals on the St. Lawrence River, a much needed operation. The result of this will be that when completed there will be a magnificent and unrivalled water-way, despite great difference in levels and the unsurmountable rapids, sufficient for the necessities of traffic for years to come, extending about two thousand five hundred miles: this waterway exists already; it is now to be improved in part.

The railway bridge of the Canadian Pacific Railway over the St. Lawrence River, above Montreal, is just completed, and affords a striking contrast with the "Victoria" bridge, designed and executed by the great English engineer, Robert Stephenson, nearly thirty years ago (1859.) This bridge is constructed on the tubular principle, while the new one is a cantilever.

The Roman Catholics of Montreal are rejoicing over the work of finishing the great Church of St. Peter's. About $300,000 have been spent upon it up to the present, and it is thought $150,000 more will complete the edifice sufficiently for occupation and use. As the diocese consists of 400,000 Catholics, it is thought there will not now be any opposition offered, and that the money will be willingly subscribed. The church is on the model of St. Peter's at Rome; the dome rises to a height of two hundred and sixty feet, and as it stands on the brow of a short but steep hill, it occupies a very conspicuous position from all points of the compass.

The Minister of Education for the Province of Ontario, has a scheme for establishing a "chair of architecture." There seems to be hardly room enough for such an institution, but it is a good thing

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that any step should be taken in the right direction likely to be of service ultimately.

The Toronto Trades and Labor Council and the Minister do not agree on the subject of manual-training in schools, as proposed by Mr. Ross (Minister of Education) for the advantage of those who have to earn their livelihood by skilled labor. The Trades and Labor Council sent a deputation to Mr. Ross — who laid their case before him, but failed to convince him by their arguments. The Secretary says "that a course of manual-training, if inaugurated, will result in no good commensurate with the amount of certain harm in an aggravated form, which must ultimately ensue to all who live by mechanic callings in Ontario." This dictum is somewhat vague, but the "ultimately" saves the Secretary's bacon, *pro tempore.*

The plumbers' strike is as far away from a settlement as ever. Masters and men firmly adhere to their own opinions, each side being convinced that in the long run it must be successful.

The by-law enforcing examinations for masters and men before practising the trade, and granting certificates to those who successfully pass, continues to send men up in batches for their unwelcome ordeal. The examiners are at present exercised over a clause in the by-law, which states that licences or certificates shall only be granted to Canadians either by birth or naturalization. They consider they have nothing to do with a man's nationality, and that if he passes a good examination, he is entitled to ply his trade. If this clause is enforced, it would hardly be consistent with the notion of importing skilled plumbers.

It is satisfactory to note that there is some attempt at association of architects now being made in Toronto. The Toronto Architectural Guild, a somewhat informal institution of about twelve months' age up to date, is already beginning to make itself felt as an influential body in professional matters. At present the Guild is mainly of the nature of a social club; the members meet once a month at different places in the neighborhood of Toronto, dine together and then discuss matters of professional interest. No attempt has been made at definite organization except that each member pays a subscription and pays for his monthly dinner. There is no president or council, but the Guild has an Executive Committee of three members, one of whom is Secretary and Treasurer, and to whom, as I understand, the origin of the Guild was principally due, Mr. S. G. Curry, of the firm of Darling & Curry, architects of Toronto. The Guild had something to do with the arrangement of the conditions for the Board of Trade competition, and has made its influence felt in connection with the proposed reduction in the size of bricks by the Brickmakers' Association. The brickmakers finally agreed that their brick should be 8¾" x 4⅛" x 2⅝", the architects being satisfied as these dimensions were very close to theirs. Members of the Guild agree to specify not less than 80 per cent of all bricks used in their work to be hard brick.

The profession is apparently in a far more healthy condition in Toronto than elsewhere in Canada. The Minister of Education intends to appoint a lecturer on architecture in the School of Technology. The *Canadian Architect and Builder* says "there are so many untrained men in the ranks of the architects, and the public are so unable to judge good architecture from bad that the few good men receive but little recognition, and that only from the cultured few." This is saying a good deal, perhaps a little too much, for although many "untrained" men have large practices, yet sooner or later the few good men cannot fail to be recognized and known pretty widely. An untrained man may make a considerable income out of his business, and always remain unknown, whereas a trained man's first building even is bound to bring him some fame.

There is also in Toronto an Architectural Draughtsmans' Association for the mutual improvement of draughtsmen and students. These efforts on behalf of the profession are highly commendable, and it would be well if other places would follow suit.

In Montreal architects are horribly jealous of each other. The English are jealous of the French and *vice versa*, and the English are jealous of each other, and the French likewise. An architect was introduced to another by a mutual friend a little while ago as "a brother professional," and was greeted with the blunt remark, "Oh, there are no such things in this country."

Students in the offices of members of the Toronto Architectural Guild come in for considerable encouragement. They are invited to compete this month for a prize of $15 in books, for the best set of measured drawings of one of the entrances to the University, a building in round-arched Gothic, with some rather intricate details.

Toronto can boast a better library of professional or architectural books than any other city in Canada, and it speaks well for the intelligence and wisdom of the Board of Management, that they so freely encourage the study of art and do all in their power to help students. The Free or Public Library is an excellently managed institution. The books on architecture and building number just about one hundred, not including some works, such as Rawlinson's "*Five Ancient Monarchies*," which are catalogued as historical. Among the books, and first in point of value, is Ferdinando Ongania's work on the Basilica of St. Mark's, Venice, which consists of several large folios of colored plates and twelve volumes of smaller plates. The price paid, I believe, for this book was $400, and duty in addition, for the Government has not yet got hold of the idea that such a thing is necessary for the education of the country.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

ENTRANCE TO THE CONVERSE MEMORIAL LIBRARY, MALDEN, MASS. MR. H. H. RICHARDSON, ARCHITECT.

[Helio-chrome, issued only with the Imperial Edition.]

GOTHIC TOWERS AND SPIRES, PLATES 25, 26 AND 27. — LINCOLN CATHEDRAL; ST. MARY'S, STAMFORD; ALL SAINTS', BUCKWORTH; ST. PETER'S, ALDWINKLE.

[Issued only with the Imperial Edition.]

RUINS OF THE CHURCH OF THE COVENANT, WASHINGTON, D. C. MESSRS. J. C. CADY & CO., ARCHITECTS, NEW YORK, N. Y.

SEE the "Letter from Washington" elsewhere in this issue.

DESIGN FOR CHURCH AND CHAPEL AT SECOND AVE. AND 72D ST., NEW YORK, N. Y. MR. R. H. ROBERTSON, ARCHITECT, NEW YORK, N. Y.

MANTELPIECES. MR. R. H. ROBERTSON, ARCHITECT, NEW YORK, N. Y.

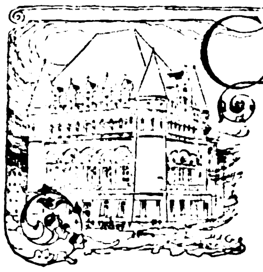
HOUSE AT BRIGHTON HILLS, NEWTON, MASS. MESSRS. WAIT & CUTTER, ARCHITECTS, BOSTON, MASS.

HOUSE FOR DR. A. G. CURTIS. MR. E. A. KENT, ARCHITECT, BUFFALO, N. Y.

RICHMOND MEMORIAL LIBRARY. MR. J. G. CUTLER, ARCHITECT, ROCHESTER, N. Y.

HOUSE FOR A. EDWARD ROGERS, ESQ., ROXBURY, MASS., DESIGNED BY MR. MURRAY SMITH, BOSTON, MASS.

CINCINNATI.



SUIT OVER A RETAINING-WALL.

A SUIT was recently decided by Judge Drummond of the United States Circuit Court which will be of interest to architects in general. The case in question was a suit by the United States Government against the estate of George A. Smith, and it appears from evidence that the Smith estate was erecting an eight-story office-building parallel with the United States Government building, with an alley ten feet wide separating their building (which was one hundred feet long) from the Government building.

Mr. Smith's wall went down twenty-one feet below the curb-stone and was three feet six inches wide at the bottom, carried up a distance of ten feet, with batter of six inches, and the remaining height of the wall was built of a uniform thickness of two feet six inches. This wall acted as a retaining-wall and was carried around on Walnut Street as well as on the alley. The wall on Walnut Street stood all right and is still standing after a lapse of some two years, but on the alley the wall for a distance of about fifty feet in length fell-in before it was fully completed, and in falling carried all the earth in the alley clear back to the Government retaining-wall and undermined their sidewalk, which was made of Portland cement. This sidewalk stood for some two months afterwards, self-supporting, but finally, owing to one cause or another, broke off and fell, and this suit was for the payment of this sidewalk.

It should be stated that when the caving of the alley took place the filling which had been made by the Government was composed of all sorts of débris, such as street scrapings, tin cans and what-not for a depth of some six feet below the grade of the alley. Below this point the filling was of the proper material, to wit, gravel. The Government retaining-wall was thirty-two feet deep below the alley and was eleven feet thick at the bottom, and was off-set on the alley side in steps of about four feet in height and from nine inches to twelve inches thick. Mr. Smith's defence against the action of the Government was that the fact that the Government in building their wall in the way just described had made all the filling in the alley act as a wedge against the Smith wall, thereby throwing on his wall the entire burden of the support of the alley, and the defence further claimed that the Government wall did not support any of the alley

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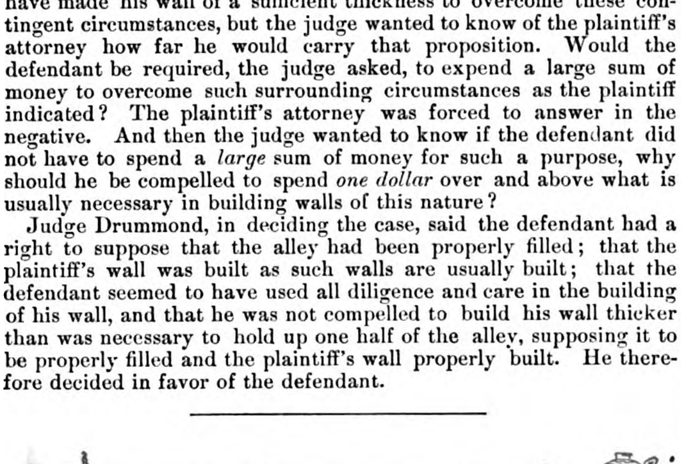
filling. The defendant Smith claimed that the Government in building their wall in off-sets did not tend to support the alley at all, as they were bound partly to do, but that these off-sets in their wall simply supported so much of the earth as would form a triangle on each ledge, which virtually amounted to nothing, and that all the rest of the filling, as has been stated, was thereby thrown against the Smith wall. The Government claimed that the Smith wall was too weak to sustain its proportion of the filling in the alley, and that the defendant should have taken in all the surroundings and should have made his wall of a sufficient thickness to overcome these contingent circumstances, but the judge wanted to know of the plaintiff's attorney how far he would carry that proposition. Would the defendant be required, the judge asked, to expend a large sum of money to overcome such surrounding circumstances as the plaintiff indicated? The plaintiff's attorney was forced to answer in the negative. And then the judge wanted to know if the defendant did not have to spend a *large* sum of money for such a purpose, why should he be compelled to spend *one dollar* over and above what is usually necessary in building walls of this nature?

Judge Drummond, in deciding the case, said the defendant had a right to suppose that the alley had been properly filled; that the plaintiff's wall was built as such walls are usually built; that the defendant seemed to have used all diligence and care in the building of his wall, and that he was not compelled to build his wall thicker than was necessary to hold up one half of the alley, supposing it to be properly filled and the plaintiff's wall properly built. He therefore decided in favor of the defendant.



THE FALL OF THE CHURCH OF THE COVENANT'S TOWER.

On the morning of August the 23d I was startled by the information that the Church of the Covenant had fallen. The evening before about seven o'clock I had passed along Connecticut Avenue, and it was standing intact, apparently strong and firm. Shortly after hearing of the disaster I visited the ruins and found the church in the condition shown in the illustration. A Committee, or Commission, consisting of Bernard Green, Civil Engineer ex-assistant to Colonel Casey, Thos. B. Entwistle, Inspector of Buildings, and Clifford Richardson, Inspector of Asphalt and Cement, was appointed by the District Commissioners [our executive rulers] "to investigate all the circumstances connected with and pertaining to the fall or the falling of the tower of the Church of the Covenant." It is noteworthy that no architect was appointed on this commission, and that a chemist was the third man where we would have expected an architect.

No one having been hurt, of course no criminal action could be brought against any one, and it will undoubtedly be a question for the courts to decide as to who is monetarily responsible. The investigation, one of the District Commissioners asserted in an interview, was to see if the Inspector of Buildings was in any way derelict in his duties. In fact, this was the only ground on which they would have had authority to order such an investigation as there was no one physically affected: the matter was a monetary question between the architects, Messrs. J. C. Cady & Co., of New York, the builder, W. C. Morrison, of Washington, and the Board of Church Trustees.

The Commission was badly constituted for its purpose. The Inspector having already passed judgment on the plans, as well as representing himself, while a chemist was of little practical value in making tests of pulverized lime and cement mortar. Mr. Greene seems to have been the only one of the three who should legitimately have been appointed for the purpose.

The report of the Commission was handed in on September 6. The long delay being necessary to have the débris cleaned away so that the original foundations could be examined.

Although the Commission was poorly constituted, the report was full and clear.

First, the specifications and methods of construction called for by the architect's plans were described, and then the method of construction and materials used by the builder.

Although cracks and signs of failure were noticed months before, only a few were aware of the fact.

The tower was one hundred and thirty-three feet and three inches above the concrete footing.

I quote from the report, as the description is full, and most of their conclusions seem to be correct.

The masonry of the tower had been finished excepting a few pieces of the last or coping course of stone and the four terminals for the corner-turrets, one or two days' work of the masons. ' When the height of sixty feet was reached at the beginning of the winter," the report says, ' a few slight cracks were observed in the water-table and sill-course and in the joints of the rubble foundation just below the water-table. As the work went on through the spring and summer these cracks increased in size and others continually appeared in various parts, generally distributed throughout the base of the tower from the sandstone tablets down into the foundation walls. The growing uneasiness of the contractor and building-committee on this account became, during the last week or two before the fall, real anxiety. They did not fail to notify the architects, who made examinations and assuring reports, as we show below, and who allowed the work to proceed.

"Finally, in the afternoon of August 21, a large stone in the south door-opening on the first floor, was heard to crack with a loud report, followed from hour to hour by other cracks, and especially a vertical one in the west jamb of the same door-way, which opened several inches, the wall separating at its centre like a clam-shell. This was observed at its maximum about nine o'clock in the evening, and several small pieces of mortar and stone were heard to fall from an apparent height of twenty feet inside the tower at the same time. Thoroughly alarmed by this time, the contractor and a member of the building-committee caused the sidewalks and all approaches to the tower to be barricaded, and directed the watchman to remain outside of the building during the night. High wind gusts had occurred at intervals during the day and again about the middle of the night sufficient to have produced a slight jarring effect upon the tower, and undoubtedly hastening the crumbling observed. The watchman heard occasional cracks during the night until 4.25 o'clock in the morning. While he stood on the N-Street sidewalk, between Eighteenth Street and Connecticut Avenue, in company with a policeman, the two men heard continued sounds of cracking stone followed quickly by the falling of several pieces of stone within the tower, and in a few moments observed the lower portion of the masonry crush and bulge, and the whole mass sink down vertically upon its own base, crumbling into a pyramidal heap of stones and sand, and filling the air with a dense cloud of dust. It is significant, also, that the sound of the fall was heard by few persons in the neighborhood, being more like that of an avalanche of gravel and sand than of a strongly coherent stonework requiring much force to break it up. The eye-witnesses say that the belfry came down intact and erect until it reached the heaping pile, where it went to pieces and was scattered uniformly over it.' "

. . . .

"It must be said that the specifications and designs themselves are also at fault;" first, in specifying rubble-work for the walls laid in a mixed lime and cement mortar, and then not making the foundation walls much thicker and stepped up near the top with a capping of large, flat stones to receive the superstructure walls or piers. Furthermore, the masonry should have been required to be done with extraordinary care and skill, such as to raise it well above the class of ordinary rubble-work. Although quite aware that excellent mortar can be made of a mixture of lime and cement, we deprecate the use anywhere, in a tower of this sort, of any but the best pure, hydraulic cement mortar. In usual practice it is difficult enough to get even this properly made and used, not to complicate the work by admixture of lime. Therefore, while the statement would be untenable that the tower, and even the foundation walls in question, could not have been built of the given dimensions with great security even in rubble-work, by using the requisite materials and workmanship, we must regard an ordinary specification, such as the one now under consideration, quite inadequate for the purpose. A higher class of materials, workmanship and system of construction should have been specified, involving, of course, a somewhat greater cost, but none the less essential on that account. Rubble masonry is the lowest and poorest class of mortar stonework and a fabrication entirely by the mason. The stones are not prepared and assigned to positions for him. The foundation walls should have been of hard-burned brick, squared stone, or thicker in high-class rubble, as stated, and the ashlar backing of hard brickwork or excellent stone masonry, all laid in best hydraulic cement mortar. With proper and more constant inspection, direction and supervision, very much better work than was done would have been secured, even under the specifications as they stood, and the tower would not have fallen, but yet the margin of safety in it would have been too narrow for a really substantial and permanent structure.

"In short, the specifications, as to the tower masonry at least, were too general in their terms, not even distinguishing between the comparatively dwarfed and lightly-loaded church walls and the lofty, heavy, storm-beaten tower. They dwelt too briefly upon the details pertaining to strength and stability, and left too much to the interpretation of the contractor, local building-practice and the specified supervision of the architects. The clause that the ashlar shall ' be laid up after the most approved system of random ashlar work ' seems to refer to the appearance it shall present to the eye rather than to its bond as an integral part of the wall. Nor did the drawings supply details of construction of the rubble or the ashlar masonry. They contained nothing whatever to indicate how or to what extent the work should be bonded, or the sizes, shapes and distribution of thorough or other bond stones, or the kinds and frequency of anchors, clamps, strap-iron or other devices for tying and knitting the work together.

"Even the specifications as they stood, however, were not complied with by the builders, in several particulars, seriously affecting the strength of all masonry. Thus the rubble work was not ' well

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bonded,' and the mortar did not contain 'best brand of Rosendale cement.' Neither did the stones of the ashlar fulfil, in a proper sense, the specifications as to minimum thickness, depths and heights. It is true that a considerable number measured somewhere within these ugly shapes the full thickness required, but very rarely at the points meant; namely, on the bed and build joints, and in almost no instance on both in the same stone. The stone averaged less than the minimum sizes, a large number being mere sharp-edged slabs difficult to secure well in place without iron anchors and incapable of good bond with the rubble backing. The specifications of minimum sizes implied a goodly number of larger stones, but these were almost entirely wanting. The specifications to use 'galvanized-iron clamps, wherever necessary or expedient, to the ashlar and backing together,' was also practically disregarded throughout.

"Therefore the work was not 'first class; of the best kind,' nor 'performed in a thorough and workmanlike manner,' and of course the contractor did not 'well and sufficiently erect' the tower 'agreeably to the specifications, in a good workmanlike and substantial manner,' but did evidently do so 'to the entire satisfaction' although not under a sufficiently close and continuous 'direction and supervision of the architects' because the latter were not exercised. The deplorable results were due in great measure to an entire absence of any continuous personal direction, supervision, or inspection by the architects, or their representatives, other than some occasional visits, for a few hours or a day each, at intervals or some six weeks. In the beginning the church committee endeavored to secure local superintendence of the work, but the architects naturally objected, and positively refused to entertain any such proposition, even to the extent of timing their visits of inspection by any notice from the committee or their agents, and the question was set at rest finally by the following paragraph in a letter of the architects under date of April 9, 1887, before work on the building had begun: 'We feel, however, that we cannot in so important a building as this take the responsibility (of "absolute control of the building and work") without using our own judgment as to when and how often we should visit it, so we propose to make such visits according to our judgment, and the committee can pay whatever portion of our traveling-expenses they see fit. We had much rather assume a burden ourselves in this way (although it is entirely contrary to professional practice) than to run the risk of so important a building miscarrying.' And so this arrangement has continued from the beginning to the present time.

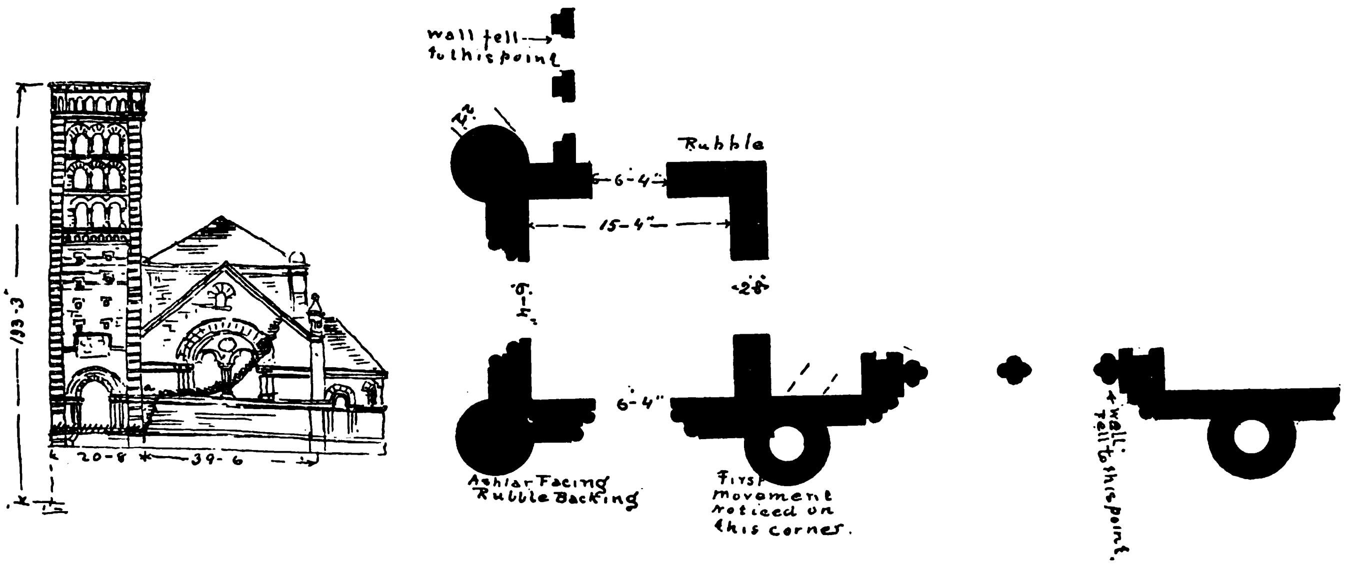
"Masonry to be suited for a tower of this kind, and above all a rubble masonry, should have been watched constantly by a competent inspector. In this case it was all left to the masons excepting one inspection when started on the concrete footing, a second when the water-table had been reached, a third at a few feet above the doorway arches, a fourth when the tower was at half height, and so on. The stone-cutters, mortar-makers and masons had their own way the rest of the time.

"When the cracks appeared and as they increased, the architects were sent for and came and made examinations, which they reported upon to the committee. Thus, the following resolution was sent to the architects on January 16th last: A resolution was sent to the architects by the building-committee notifying them that they had learned that the cement and mortar used in the building was not of the quality called for, and in some other respects the work had not been carried on according to the provisions of the contract, and that it seemed to the committee that these defects would not have occurred if there had been a proper supervision of the work by the architect.

"On resumption of work in the spring the architects examined and approved it and allowed it to go ahead. Correspondence regarding the continued appearance and increase of the cracks followed, together with some inspections by the architects who, on June 6th, when the work had reached the belfry stage, reported 'that there was no danger, that the tower would certainly not fall, nor any portion give way suddenly without due warning,' and on June 13th, that they 'considered it safe to proceed slowly with the tower and to finish it according to the original plan, except, perhaps, in the matter of the heavy stone cornice at the top and the heavy tile termination, for which a lighter material may be used to lessen the weight.' From this time until the fall they relied on information, at short intervals, from the contractor, that the cracks were not increasing much and there was no cause for alarm.

"Thus, in brief, it appears that the architects' design of the foundation-walls and specifications for the construction of the tower were faulty; that, largely for want of the intelligent supervision required of the architects, the contractor's materials and workmanship were inferior and unsuitable, and that, therefore, the beautiful tower fell. The manner of its fall and its complete reduction to a solid heap of small stones and thoroughly disintegrated mortar showed its general weakness so plainly that the wonder was not that it fell, but rather that it stood so many weeks erect.

"In form and dimensions the design of the tower furnishes a thoroughly substantial and permanent structure, needing but the simplest kinds of good materials and workmanship for its proper erection. There is no reason on this score why it should not be at once restored. Its proper construction involves no unusual difficulty or expense. Its height is but moderate, for there are numerous entire buildings of equal height in the large cities. The remaining walls of the church were, of course, built in the same defective manner as the tower, more pains being taken with their exterior appearance than their strength. Being very low and comparatively thick, however, and carrying but little weight except their own, we cannot say that they are not perfectly safe, but we recommend an examination at a few points to fully put their condition beyond question."



The want of constant inspection necessary, of course could not be expected from the Building Inspector of the district, but as the character of the stonework, the shape of the rubble, and the bevelled beds of the ashlar and the character of the mortar and cement used was continuous from the footing to the capping stones, it seems that either the architects or Building Inspector, particularly the architects, should have noticed its faulty character, if not in accordance with the plans and specifications, and called a halt. The defects were not in some one piece of construction that could be covered up in an hour, a day or a week, but the same faulty masonry was continuous for nearly a year.

The report tells us that the strains were properly calculated for the best character of rubble. I do not think that much dependence could be placed on rubble piers two feet by eight inches thick at the base of a tower over a hundred feet high. The corner projection had a vent-flue allowing a wall one foot thick around it, including ashlar and backing. After the tower was up some distance this was filled with concrete by order of the Building Inspector. Instead of strengthening, this concrete by expansion may have weakened the stability of an unstable pier.

The weights as given seem excessive to impose on rubblework. Rankine says the resistance of common rubble to crushing is not much greater than the mortar it contains. The weight on these piers was 140 to 190 pounds per square inch, increased to 220 pounds in case of winds, according to the calculations of the Commission. So a strain of 15 tons per square foot was liable to bear on some one of these piers. Kidder says the granite piers of the Saltash Bridge (presumably masonry of squared stones) sustain nine and one half tons per square foot, while the highest pier of the Rocquefavour stone aqueduct, Marseilles, sustains a pressure of 13½ tons per square foot. Mr. Louis DeCoppet Berg in his table, article "Safe

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Building" (in the *American Architect*, July 3, 1886), gives as crushing strength of Rosendale cement and lime mortar (the kind called for in the specifications) 550 pounds per square inch, or the safe load as 125 pounds per square inch. Nearly double this weight was liable to come on the piers and this only allows a factor-of-safety of a fraction less than four and a half, while Kidder and Trautwine call for a factor-of-safety of from six to ten. Using a factor-of-safety of six (the lowest for piers), the weight that the piers should have borne safely is 91.4 pounds per square inch, or less than half the weight that was actually on them according to computations made by the Commission.

Who is to replace the work is still an unsettled question, and it is a question, I think, that the courts will be required to settle.

The subject being an unusually interesting one I have necessarily lengthened my letter. The accompanying sketch of the church before the failure, made from the plans, and the ground plan of the fallen portion will show the extent of the ruin.

IMPROVEMENTS AT EDGEWATER.

EVEN Chicago people scarcely realize the wonderful rapidity with which the suburbs are growing and making of the country within a radius of fifteen miles from the court-house practically one great city, even if not under one central administration. The opening about two years ago of a second railroad to Evanston (fifteen miles to the north) has brought into the market a long stretch of country directly on the shore of Lake Michigan, which was previously accessible only with great difficulty. To many people the lake shore has irresistible attractions and is above all else to be desired as a locality for residence, and, as a result, numerous little villages have either sprung suddenly into existence or else been stimulated into lively growth by this new railroad.

Most of these new suburbs are as like as possible to imagine, with their little wooden cottages built upon twenty-five to fifty feet of ground. However, one of these towns has started out on a decidedly higher level than anything attempted within recent years in the vicinity of Chicago, and a very large sum of money has already been expended in really permanent and desirable improvements at Edgewater, as the place has been called. A Philadelphia syndicate purchased quite a large tract of land at this point (which is something like seven or eight miles from the centre of the city) and two years ago commenced a series of improvements which have caused several of these acres to be changed from waste land and barren sand-hills into pretty country-places, each house having all the most modern conveniences. The scheme has been to make a model town and, as a result, rules and regulations abound and flourish to such an extent as to somewhat disturb the equanimity of the freeborn American who fondly imagines that in buying a piece of property he buys the right to do about as he pleases with his land. Here, however, the individual is apparently very quickly brought to his senses and duly given to understand that he is a mere infant and that all his needs will be properly attended to by the parental corporation which knows what he should have and what he should not have. But however the rules and regulations may effect the feelings of the inhabitants, the results attained are extremely attractive to the eye of the observer.

For something like a quarter of a mile from north to south the sand-hills have been levelled, streets laid out, water-pipes and sewerage put in, and a town blocked out. Not only have the streets been merely staked out, but they have been curbed with stone and, at an evidently great expense, macadamized. Good-sized trees have been planted at each side and broad stone sidewalks put down, so that the roads within the improved district are similar to the city boulevards. Water is brought from the water-works of the town of Lake View at the south, but the sewerage system is for the village only and empties into the lake, a condition of affairs that will undoubtedly eventually require some serious attention and probably a change.

The idea of the promoters of this enterprise has been to make a thoroughly first-class suburb, and with this aim in view they have laid out large lots and refuse to sell to parties who do not guarantee to build houses equally as good as those already erected. With one or two exceptions all the work here has been under the supervision of a single architect. The buildings are all extremely picturesque in outline, having a strong touch of the colonial, which is well carried out in the use of shingles much more lavishly than is usual in this part of the country. The railroad-station itself is a neat little structure of wood, mostly covered with shingles, and while quite unpretentious at the same time has a certain prettiness about it that elicits remark. This station has a handsome and well-kept lawn, with flower-beds at two sides, while the name "Edgewater" is spelled out upon the green in beds of foliage plants, thus making a strong contrast to the adjoining stopping-places and in a certain way giving the key-note to its superiority. Moreover, it is a superiority that seems to be maintained through the whole town. Evidently everything is done for effect, but it is not with a splurge, for all is quiet, dignified and in extremely good taste, breathing a spirit of refinement that is truly refreshing. Most of this effect is no doubt due to the ability of one man, for, as noted before, one architect has done the work.

The houses all seem to be well built, most of them having the first story of either red or white brick and the upper portions covered with stained shingles. The interiors are principally finished in the natural woods, California redwood and Georgia pine predominating. Most of the houses are architecturally good, but two or three are noticeably so on account of their particularly quiet and dignified appearance and their charming outline. Had they been built anywhere but in a widely-advertised suburb they would have attracted more than usual attention and a more just appreciation.

In all, about thirty buildings have been erected by the syndicate and they have been offered for sale at terms unquestionably reasonable; but, apparently, quite a large number are still unsold and rumor has it that the projectors feel considerably discouraged by the small number of sales during the past year.

To an ordinary observer it would seem as if the experiment of putting upon the market so expensive a suburb was several years in advance of the demand, and it cannot be greatly wondered at that many of their houses remain tenantless, for there is still an immense choice of land for suburban homes in the vicinity of Chicago. People willing to pay from six to ten thousand dollars or more for a house are not attracted to an absolutely new locality with all the possibility of malaria and the discomforts of being removed from friends, schools, churches, etc., when there are a dozen other and older suburbs that for that same money can offer nearly as much elegance, and a certainty of agreeable society and good markets.

Each block has its alley running from north to south, and here, with the regularity of a line of soldiers, are placed the garbage-boxes, all of exactly the same shape, size and color. These alleys are particularly intended to be used by the butcher, baker and candlestick-maker, so that all disagreeable traffic will to a very great degree be kept off the streets.

One of the great features of Edgewater is the electric-light, for gas is not brought into the village, but the streets and all houses are lighted on the incandescent system by electricity, and moreover all of this at present is done at the expense of the syndicate. When everything is lighted up the effect as viewed by the passengers on the night train is certainly extremely pretty.

The lake beach at this point is unusually broad and composed of a beautiful yellow sand. Eventually this must be one of the features of the place and evidently the syndicate is of the same opinion for at present it is impossible to buy any property directly upon the lake shore. One street, however, runs down to the water's edge, and at that point there is a tiny little park which serves as a post of observation for those who wish to see the lake or the inhabitants of the town when they take their swim in the surf of the lake.

Edgewater has four public institutions: the town store, the stables, the electric-light building, and, last but not least, the lawn-tennis courts. The town-hall, if it may be so called, is quite a feature of the place being a large and simple building of good outline. It is the general centre of the village, and is at one and the same time school, church, theatre, post-office, town-hall and the general store. The assembly-room in the second story is a fine large hall that will allow for a considerable growth of population before the inhabitants will find themselves crowded at their gatherings. A somewhat similar remark might apparently be made in reference to the lawn-tennis courts for they never seemed to be thronged, but, just the same, notices are very conspicuous as to the kind of shoes that players must wear, as if with such a host (generally four people once a day), common shoes would at once destroy this public institution.

At the extreme south end of the town is another of the public institutions — the stables, for no one is allowed the privilege of having a barn on his premises, but all the animals must be kept at the public establishment and telephoned for when wanted. This barn has a court in the centre which is reached through a broad archway, and around this court are arranged the carriage-house, stables and carriage-wash together with necessary living-rooms and office. The exterior of the building is very simple with brick below and shingles above, but the effect is decidedly pleasing, and everything about it seems to be kept in as neat and proper a way as the rest of the settlement. At the other end of the town is the fourth of the public institutions, the electric-light building. It is conveniently located for receiving coal, etc., from the railroad and while built out of the commonest material still has the same general characteristics of dignity and artistic effect as the other buildings. In fact, with but one or two exceptions each and every building in the place when considered individually, is worthy of praise, but when taken collectively, the continued use even in varied forms, of exactly the same material in the same style, causes an involuntary wish for a change. Probably as other architects commence to build here this criticism will cease to have a foundation, and in due time all will blend into a much more harmonious whole, than in any other suburb, since the start in this case has been so exceptionally good that future builders must take the fact greatly into consideration when making their designs.

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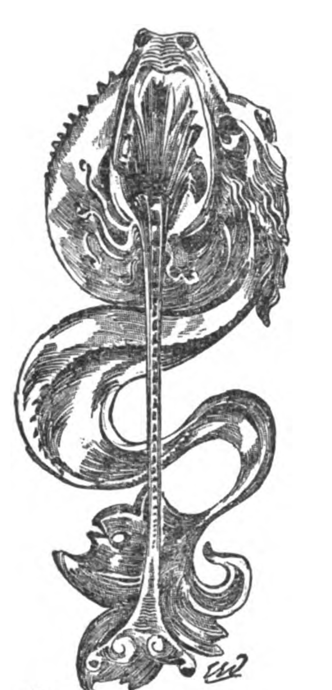
SAFETY FROM FIRE.



Door-Knocker
from the Union Brass Architectural Works
Chicago. Ill:

THE terrible loss of life by the conflagration at Springfield, Mass., a few months since, has aroused the public mind to a degree never before witnessed to the constant peril to which the people of all places and conditions are exposed from fire, and in consequence the last Legislature, in response to the call of the public, passed some laws for the further protection of the people from destruction by fire.

The importance of the subject of protection from fire cannot possibly be overestimated, and the anxiety of the public in reference to it is justly very great, and now that the Legislature of the Commonwealth has taken the matter of safety in hand and passed laws in reference to it, requiring certain kinds of fire-apparatus to be provided and used for the saving of life at fires, it may be well to examine the character of the various kinds of life-saving apparatus which the law prescribes shall be provided and used by each and every organ ized fire-department in the State, and to do so is the object of this communication.

In Chapter 426, stringent regulations are made in relation to the means of egress and escape from buildings where there are many occupants and working people — as boarding-houses, hotels, apartment-houses, tenement-houses, factories, etc. — all of which are to be kept under the most rigid inspection by officers appointed for the purpose, and these laws, if thoroughly enforced, will go far to prevent in the future the fearful holocausts of the past.

Chapter 310 is "an act to require the equipment of fire-departments with apparatus for the saving of life at fires."

The act prescribes the apparatus to be used by all the organized fire-departments of the State, and it consists, first, of a "gun or other suitable device capable of shooting or throwing an arrow or other missile with a cord attached thereto over the top or into any window of any building within such city or town, together with all needful appliances for properly working the same."

This arrangement is for the purpose of enabling the occupants of the chambers of buildings on fire to establish communication with the fire-department in the street, and to draw up a rope or any other means by which to facilitate their escape from destruction. The act requires the use of "jumping nets."

The plan of communicating by the "gun and arrow" has long been known, several devices of the kind having been invented at different times in Europe. But doubtless the best one of all was invented many years ago by Mons. Delvigne, for use in the French coast wrecking service. A full account of this invention was published quite a number of years since, and of its adoption into our own wrecking service by Hon. R. B. Forbes, whose earnest, long-continued and successful efforts in establishing the means of saving the lives of shipwrecked persons have long been known and appreciated by the entire nation.

In an address upon the subject at a meeting of the Massachusetts Technological Institute, some ten or more years since, Mr. Forbes gave a full description of the gun and arrow invented by Delvigne, and of its value in our wrecking service, and also proposed its use by the fire-departments of the cities for the purpose of sending a life-line to persons in danger in the upper rooms of buildings on fire.

Had this, or some similar device — as a powerful bow and arrow — been used at the burning of the Southern Hotel at St. Louis several years ago, and on other similar occasions, a very large number of lives might have been saved, for in almost all cases of conflagration of large hotels and similar structures there has always been time enough to bring the gun and arrow, with life-line attached, into use.

The act of the Legislature further requires that there be provided, as follows: "A chute, so called, made of canvas, or other suitable material, rendered uninflammable, of sufficient length to reach at a proper angle of inclination from the ground to any window in such building, said chute being provided with proper means of fastening the upper end thereof, and having a flexible ladder attached thereto." And the act requires that each organized fire-department in the State shall be provided with one or more of each and all the pieces of life-saving apparatus above mentioned, and that the members of the various fire-departments shall be periodically practised and trained in the use of the same.

It has been demonstrated in thousands of instances that a canvas chute is of all things the best and safest as well as the quickest means by which persons may descend from the windows of high buildings.

But the difficulty in using the canvas chutes is that they will quickly be set on fire and destroyed by the showers of burning cinders and the flames bursting from the windows around and below them during the conflagration.

It is well-known that the most powerful fire-engine will not throw anything like a solid, unbroken stream beyond the height of from three to four stories. Above that distance the stream breaks and scatters. Consequently all portions of the canvas chute which extend beyond three to four stories will quickly be set on fire and consumed by the showers of burning cinders and the rush of flames from the windows beneath it.

Nor can the canvas chute be thoroughly wet and kept so even to the distance of three or four stories, for the point of danger is of course, on the under side, where it is constantly exposed to the sudden rush of flame from the windows beneath it, for unless every part of the chute is kept constantly wet the flames would quickly dry the cloth in places and burns holes in it large enough for persons to fall through to the pavement below.

To be able to wet the chute with the hose pipe from a ladder is at best a doubtful thing for fire has an ugly habit of "marching on"— and at any moment the rush of flames from the windows may drive the firemen, with their hose pipe, from the ladder and leave the chute to be consumed. A few weeks since, at a large fire in Detroit, Mich., several firemen were on a long ladder operating against the fire; all at once the flames burst through the windows and they were obliged to slide down the ladder with all possible speed, and got quite badly burned at that. Similar instances are constantly occurring at large conflagrations, and they demonstrate how little reliance is to be placed upon the idea that the firemen can generally wet the canvas chute constantly and effectually from ladders.

The act of the Legislature, Chapter 310, prescribes, under penalty, the use of an "uninflammable canvas chute."

The language employed is, we think, highly misleading. Almost every one would suppose that the term "uninflammable" signified fireproof. But this is a great mistake. It means only that the cloth will not burn with a flame.

This is a point of very little importance indeed. The uninflammable" canvas chute, when exposed to contact with flame, will take fire readily, will smoulder and burn and be quickly destroyed notwithstanding its alleged "uninflammable" character.

The thing the public must have for safety is a fireproof canvas chute. This alone will meet their want. If any "uninflammable canvas chute" exists or can be produced which is really fireproof, the fact can readily be shown by exposing it to the contact of a good-sized fire and letting the flames envelop it for the space of half an hour or more. The test demanded is a fair one, and can easily be applied. We would remark here that the application of carbonic acid gas, etc., to make a canvas chute fireproof, would necessarily be transient in effect and practically of very little account.

There is one thing only which will make a canvas chute non-ignitable, non-combustible and absolutely fireproof, and that thing is water, constantly and thoroughly applied to each and every portion of the chute at whatever height it is placed and throughout the time of the longest conflagration.

The act, as we have said, requires also the use of "jumping nets," held up by several men on the street upon which the persons in danger in the chambers of buildings on fire may alight. In Prussia, where, we believe, this mode of escape was first introduced, the soldiers of the army, who largely constitute the fire-departments of the cities, have long given exhibitions of skill and daring by leaping from the windows and roofs of high buildings and alighting safely on the "jumping nets" or "canvases," and there have been successful exhibitions of the same skill and courage also given by the brave firemen of Boston and other cities.

But it should always be remembered that to perform these acrobatic feats in broad daylight, when no conflagration is in progress, is a very different thing from performing the same at midnight, when the fire is in full blast, the flames leaping upward and around and rapidly approaching, the stifling smoke obscuring the sight, the showers of burning cinders filling the air and the tumult going on below.

At such a time the most skilful expert in jumping from upper windows would need all the nerve and self-possession which he has to take the fearful leap, and the most consummate skill would be required to clear the awning frames and other obstacles below and reach with certainty the "jumping net."

What, then, would be the "jumping net" to women and children, and even to men, who are aroused at midnight and amid the scenes we have described be required to leap down from the dizzying height to the "jumping net" below?

True, there may be instances in which it could be used successfully, and therefore, to meet these possible cases, by all means let the "jumping nets" be provided.

The truth is that the public are too easily satisfied and altogether too superficial in their investigations. They stand by and see "fire

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escaping apparatus" of different kinds operated by expert firemen in the day time, and do not remember that it is one thing to "play have a fire" and quite another thing to face the stern reality, involving, as it very, very often does, the question of life or death to many and perhaps to hundreds of human beings.

Whatever is adopted for the further security of human life from destruction by fire, let it by all means be something which is as far as possible real and trustworthy. In this question there is no room for any inefficient and uncertain "fire escaping apparatus." There must be no trifling with priceless human life.—"*Safety," in the Boston Journal.*

NOTES AND CLIPPINGS

Russian Book Collectors.—It will be news to half the world that the Russian nobles are sedulous collectors of books and manuscripts. Prince Woronzoff, for instance, has a library of 12,000 volumes in St. Petersburg, and possesses another equally large at Alupka. The Princess Lunog's library contains nearly 13,000 books, most of which were collected by her father, Bibikoff. In Slavonic literature it is especially rich, and it contains about 600 works in various languages on numismatics. The late Minister of Justice, Count Panin, had a library of 11,000 volumes, which was remarkable for an encyclopedic series of works relating to the legislation of the different European States. He had also considerable libraries in the Crimea and at Marsino, near Moscow. The library of Count Scheremetjeff, the foundations of which were laid by the conquerer of Livonia, contains 25,000 volumes, many sncunobula, and a perfect treasury of ecclesiastical music. The present owner has himself increased his great literary heritage by the addition of nearly 12,000 volumes. He has been a diligent collector of books bearing upon Russian and Slavonic history and topography.—*Pall Mall Gazette.*

Destruction of Stand-Pipes.—About a year ago (January 7, 1887) an account was given of the destruction of a stand-pipe by an upward thrust due to a faulty design in building a stand-pipe larger at the base than throughout the main shaft. Two stand-pipes have recently burst in America which, although in different cities, by a strange coincidence belonged to the same man and burst on the same day within an hour of each other. In one instance the structure was a steel cylinder one hundred and thirty feet high, thirty feet in diameter, containing 630,000 United States gallons, and made of boiler-plate five-eighths of an inch at the base and one-fourth of an inch at the top. It was placed upon a stone masonry platform made of three courses of rubble masonry placed on cement. The structure was not provided with any braces, guys, or anchorage. The bottom plate was perforated with a twelve-inch orifice to receive the pipe which served as inlet and outlet. The total load on the foundations of the stand-pipe, when it was filled with water, was 552,500 pounds, amounting to a pressure of 7800 pounds per square foot on the foundation. It has been computed that the tensile stress per square inch of net section on the lower plates amounted to 25,000 pounds. As is usual in such instances, it is not known what was the exact cause accomplishing the destruction of the stand-pipe, but as water had been flowing from the top of the pipe a short time before this, it is probable that the foundation was somewhat disturbed by the water flowing over it and in that manner there was produced an unequal distribution of stress. In the other instance the tank was forty feet in diameter and thirty-five feet in height. The static head on the water-work system furnished by this tank, which was situated on a hill, being insufficient, it was raised forty feet and two circular brick walls constructed underneath it, the outer one being thirty-six feet in diameter and the inner one being twelve feet in diameter. These walls were sixteen inches thick at the top and three feet thick at the bottom, and were further strengthened by buttresses; the tank was also secured by wire guys made of wire rope. The water was supplied to or withdrawn from the stand-pipe through a single pipe entering at the bottom, but neither that nor the foundations appeared to have been disturbed in a manner connecting them in any way with the cause of the accident. A reservoir of water in Arkansas lately burst just two hours before the formal dedication of the new works, discharging more than 10,000,000 gallons of water over the ground which would have been occupied by a large concourse of people a short time later. The wall was built of stone laid in cement, being twelve feet six inches thick at the bottom, six feet thick at the top, and thirty-five feet in height. It is apparent that all these cases which have resulted in the destruction of property, in interference with all conveniences pertaining to public water-supply, safety against fire, and in great risk of danger to life, were caused by a lack of sufficient material to give sufficient stability to the structures. The accidents would certainly have been obviated by an employment of competent engineering services.—*Engineering.*

TRADE SURVEYS

The outcome of the utilization of natural-gas up to the present time has been the inventing of a number of systems for the manufacturing of artificial fuel. Manufacturers everywhere are giving more or less attention to the question of artificial fuel, and in hundreds of establishments the change has been successfully made. It has been estimated that artificial fuel is now used in establishments employing upward of 300,000 hands. Almost every day new shops and factories are adopting one of the many new methods upon the market. At the present rate of progress raw fuel will, in a comparatively few years, be confined to a very small number of steam-users. There are some thirty or forty systems now in use more or less. There are perhaps almost as many new systems under trial. Inventors, mechanics, engineers and others are devoting themselves with zeal to a more practical solution of this problem. The statistics published in engineering and special journals from week to week throw a great deal of light upon the progress that is being made. Even in the very best systems objections and defects are discovered which engineers are endeavoring to remove as rapidly as possible. Manufacturing enterprises in natural-gas localities are stimulated to effort by the probability, or, as some put it, the possibility of natural-gas giving out. Opinions differ as to this probability, and the question is about evenly balanced. One school asserts that natural-gas is constantly generated, and that the supply is unlimited and always will continue. The other school asserts the contrary. The gas-consuming public is informed that the supply is limited, and already numerous indications are given of coming exhaustion. The fact that natural-gas is discovered in widely separated localities does not lend much strength to the assertion that the supply is inexhaustible. The effect of the discovery of natural-gas has been the stimulating of the efforts to discover a substitute. The history of these efforts is very interesting. In time a new system will be introduced which will easily drive out raw fuel. The price of natural-gas is steadily advancing, and it is now almost equal to coal. The consumers of gas prefer it because of its cleanliness and the ease with which it is used. The manufacturers look at it simply from an economic standpoint. In some localities manufacturers have already gone back to coal. It is evident that natural-gas will not meet the requirements of those who live outside of its belt. The carrying of this fuel long distances is not favorably looked upon by capitalists, although one or two experiments made have proven satisfactory to the parties immediately concerned. Gas-engineers are authority for the statement that an industrial revolution in this respect is assured. Competition will drive the unwilling to the adoption of new methods. The cost of coal-mining has been reduced to perhaps the lowest possible point at the present prices of labor. Coal-cutting machinery is not found possible for general adoption. Freight rates cannot be reduced below the rates now ruling. Hence raw coal will not decline much below its present quotations. At no time has engineering and inventive enterprise been so thoroughly aroused to our urgent requirements for a new and cheap fuel as at this time. Manufacturers are preparing for a change as though they thought the exhaustion of the natural-gas supply was only a question of time. Engineers assert that artificial fuel can be made cheaper than natural gas. And they have the arguments and the figures on their side. Side by side with this progress comes the utilization of electricity as a motor, and the highest authorities among the electrical engineers assert that it is only a question of time for the successful establishment of electricity as the motive power with competition with steam no matter how cheaply the cost of the steam-raising may be made. The enthusiasts in this new enterprise may be excused for their confidence and the assurance with which they unreservedly give them. Their calculations and experiments entitle them to our consideration. Schemes for economic steam-raising power almost of a chimerical nature are now receiving indorsements from engineers and attention from the capitalists. Out of all this is sure to come radical improvements which will revolutionize the existing methods, and result in economies which are not possible with the present steam-raising methods.

Trade and manufacturing conditions continue slowly to improve. Financial authorities are somewhat disappointed at the unusual conservatism prevailing among borrowers and promoters of enterprises. There is no apparent scarcity of money, but many persons of a looking-into-the-future cast of mind have apprehensions of certain influences which will in the course of a year or two affect the business interests of the country with a great stringency. The basis for these predictions is that pursuits of all kinds, from farm to shop, are obliged to render more service now for a dollar than two, three or eight years ago. It will be time enough to take note of these prophecies and the influences referred to when they actually show themselves on the surface. At present the country is not suffering from any stringency. The banks are well supplied. The rate of interest is low where returns are sure. New enterprises are not held back where they recommend themselves to the judgment of good business men. Wages are not declining with reference to the purchasing power of money. Building has not been held back. Builders have not been discouraged. New works are projected with as much confidence as ever.

It is probable that the favorable commercial condition of former years will remain with us. As evidence of this fact it is to be noted that the gross earnings of 108 railroads for the past seven months show an increase on nearly $700,000 over the gross earning of same time last year. There is, of course, a great deal of unrest in financial and railroad circles over the inability of the Western railroad managers to come to terms and advance freight rates. The shippers are not concerned and would prefer to see the present disagreement perpetual. Building throughout the West shows very little falling off. So far as opinions and purposes in reference to next year have been expressed building will be undertaken on fully as large a scale as last spring. Building enterprise has been in nowise discouraged. All kinds of material continues low. There is a demand for houses in all the larger cities and in the country, particularly in small towns along railroads North and South beyond the Alleghanies. The iron trade maintains the strength which it manifested early in the month. Crude iron production has increased between six and seven thousand tons per day in three months. The outflow of capital Southward still continues. Southern cotton mills are paying excellent margins. New industrial establishments are multiplying and real estate sells at a low rate to investors. The manufacturers of machinery throughout the machine-manufacturing States of the North are at this time loaded up with about three months' work. There are indications that ship-building will increase very largely to supply the demand for vessels to ply between Northern Atlantic ports and the South American and Pacific coasts. A large amount of work is in sight. Companies are particularly formed to invest money very largely in this direction. Capitalists see excellent opportunities for safe investments in providing vessels for the exchange of commodities between the various ports of our own country and those of Central and South America. A large amount of lake tonnage has been determined upon for next year's construction. What we have lost in railroad building will be made up in other directions. Investors are encouraged to pursue enterprises. The cost of labor is in such a favorable condition and the cost of material of all kinds will probably continue low and regular—the condition of prices which followed the markets through 1887. We hear of a great deal of projected work. Now that promoters can rely upon a uniform cost of production it is safe to presume that much work which was not undertaken this year will be undertaken next.

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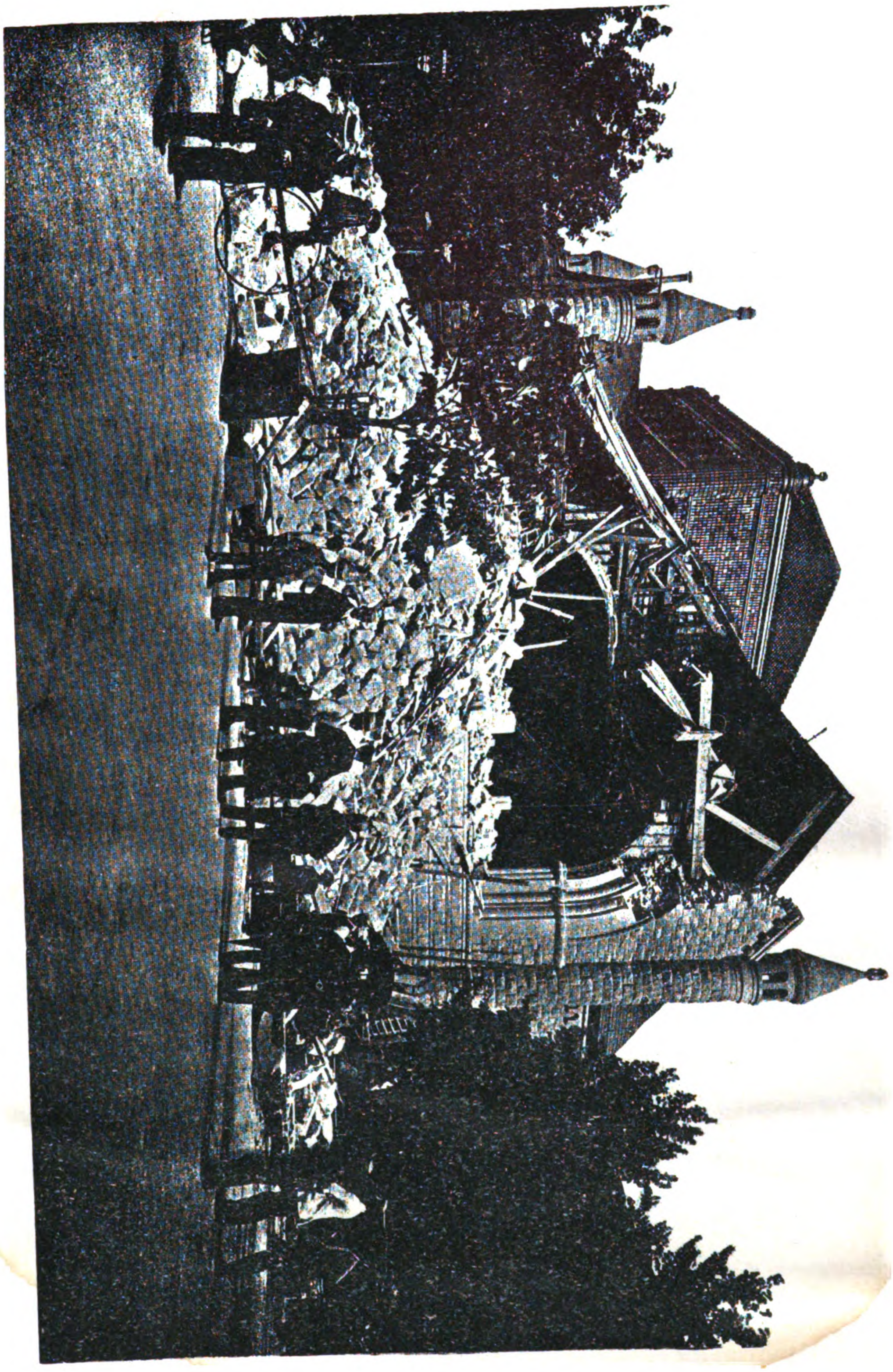

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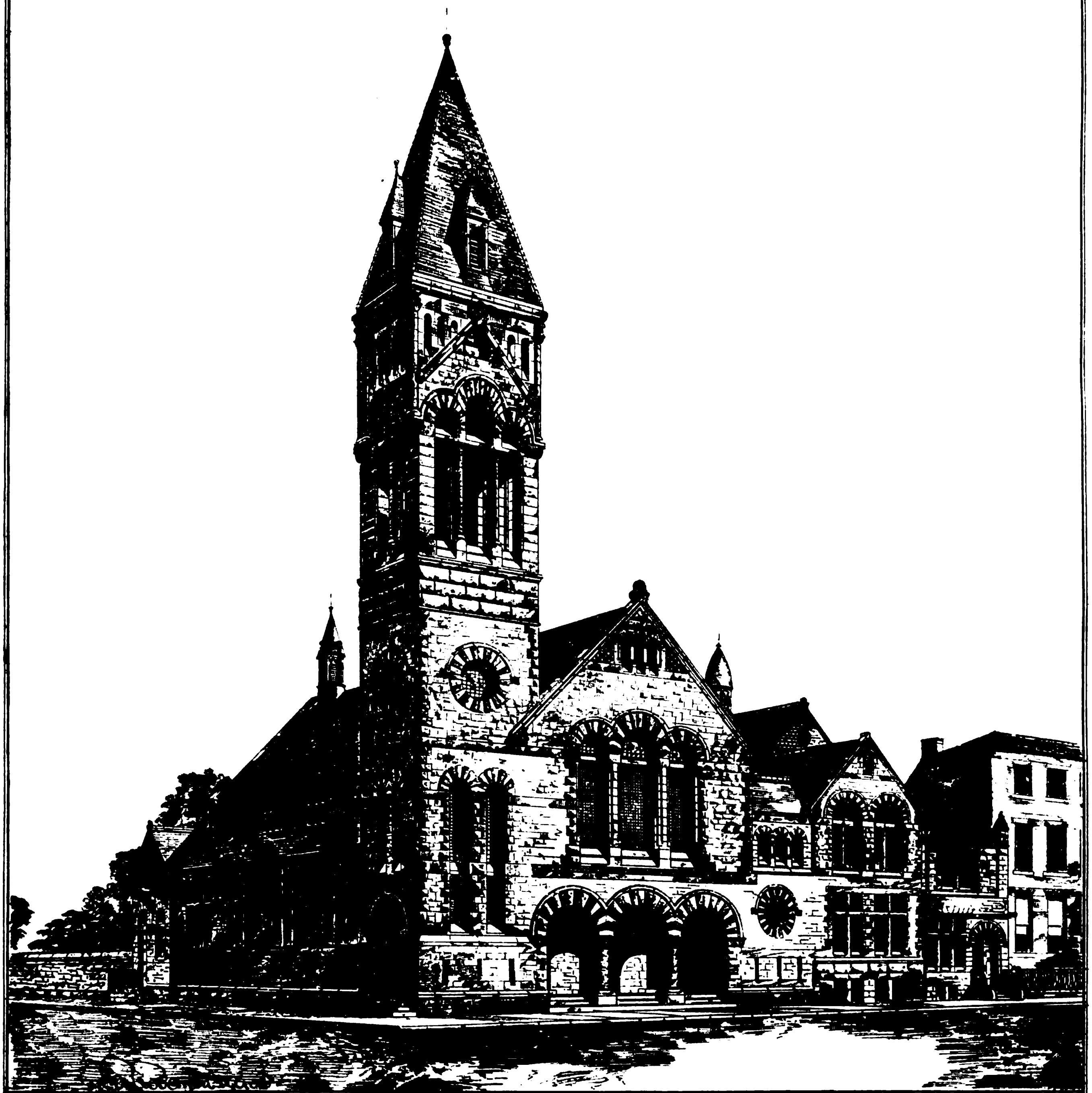

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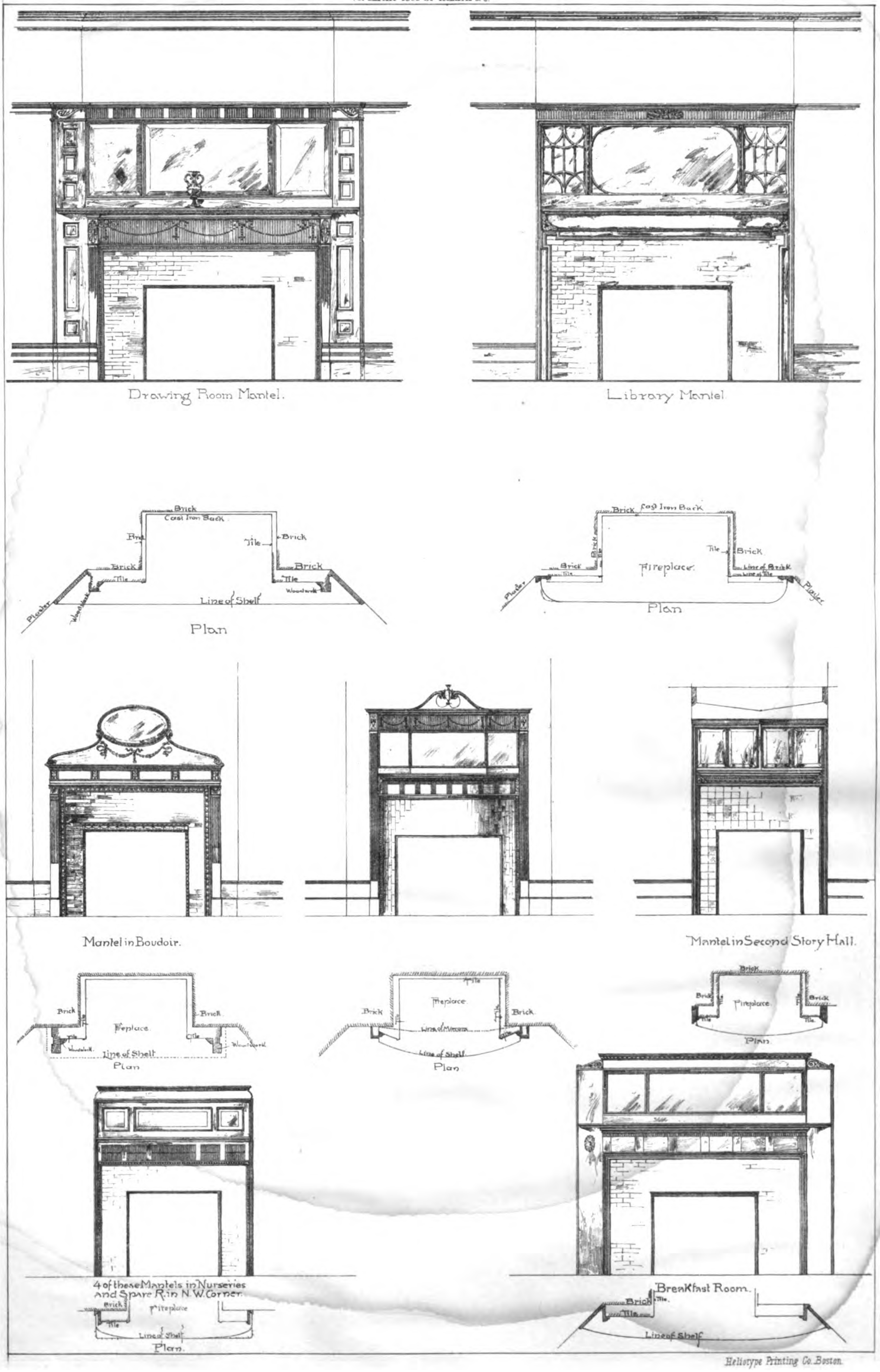

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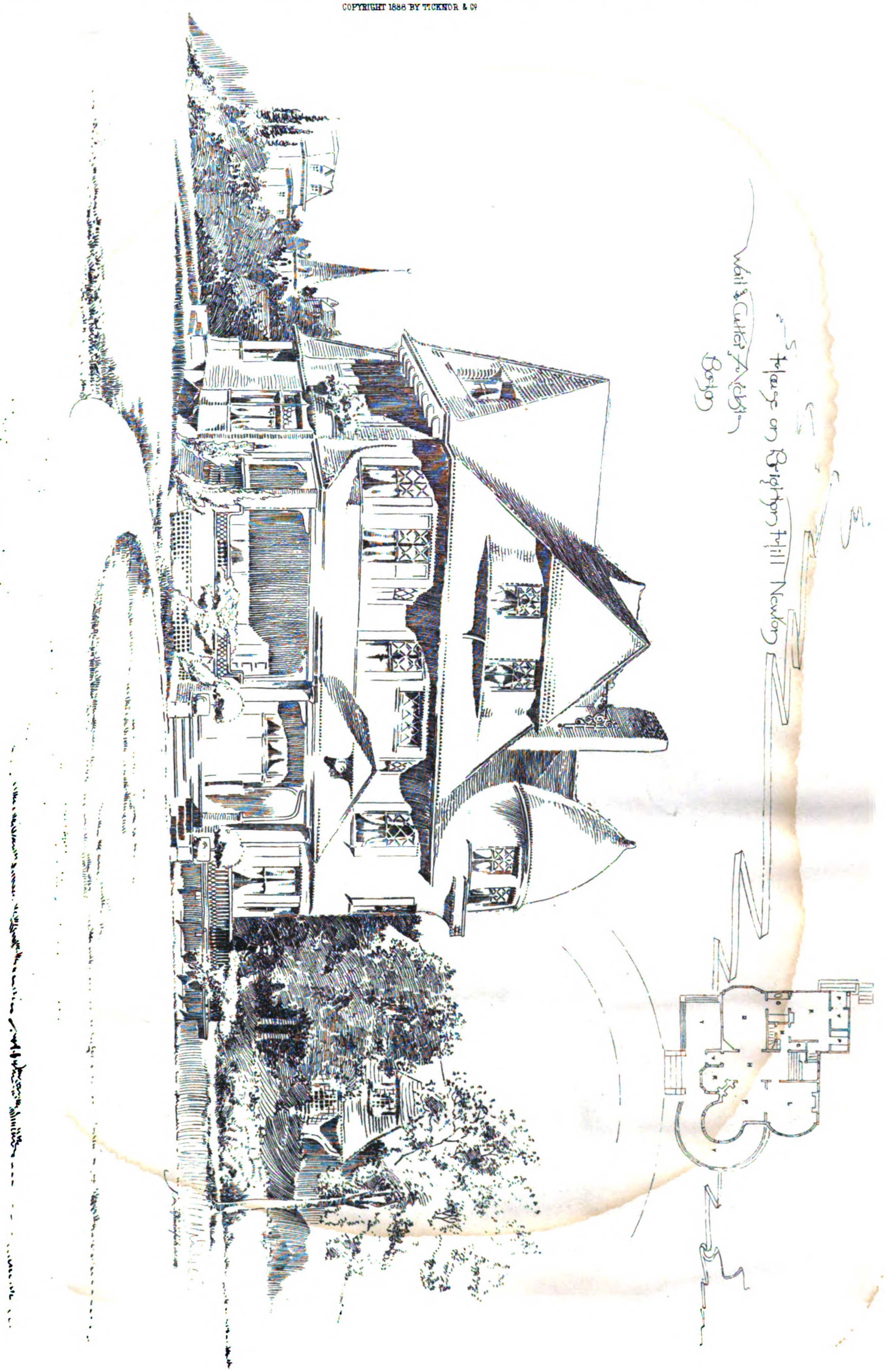

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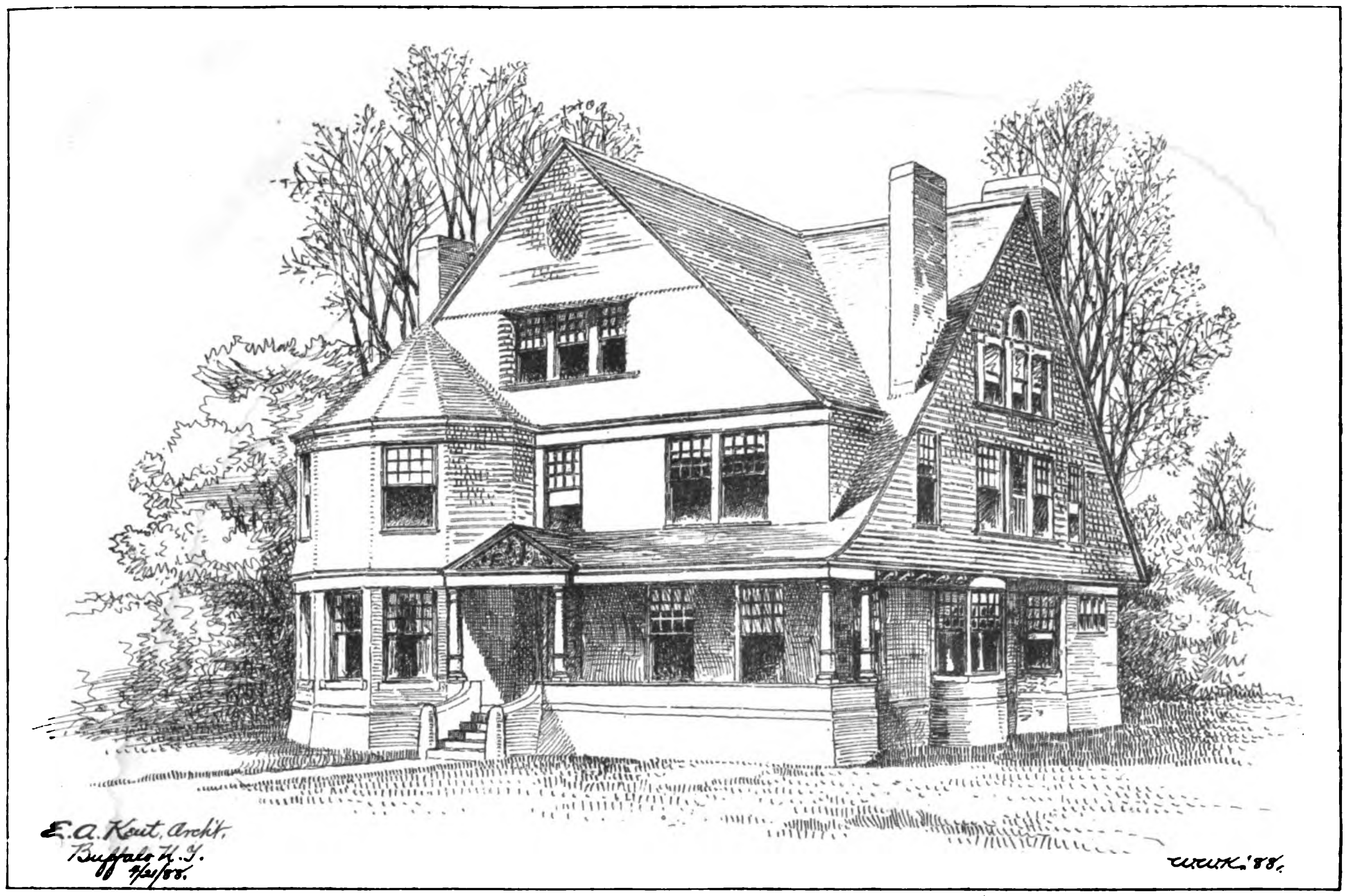

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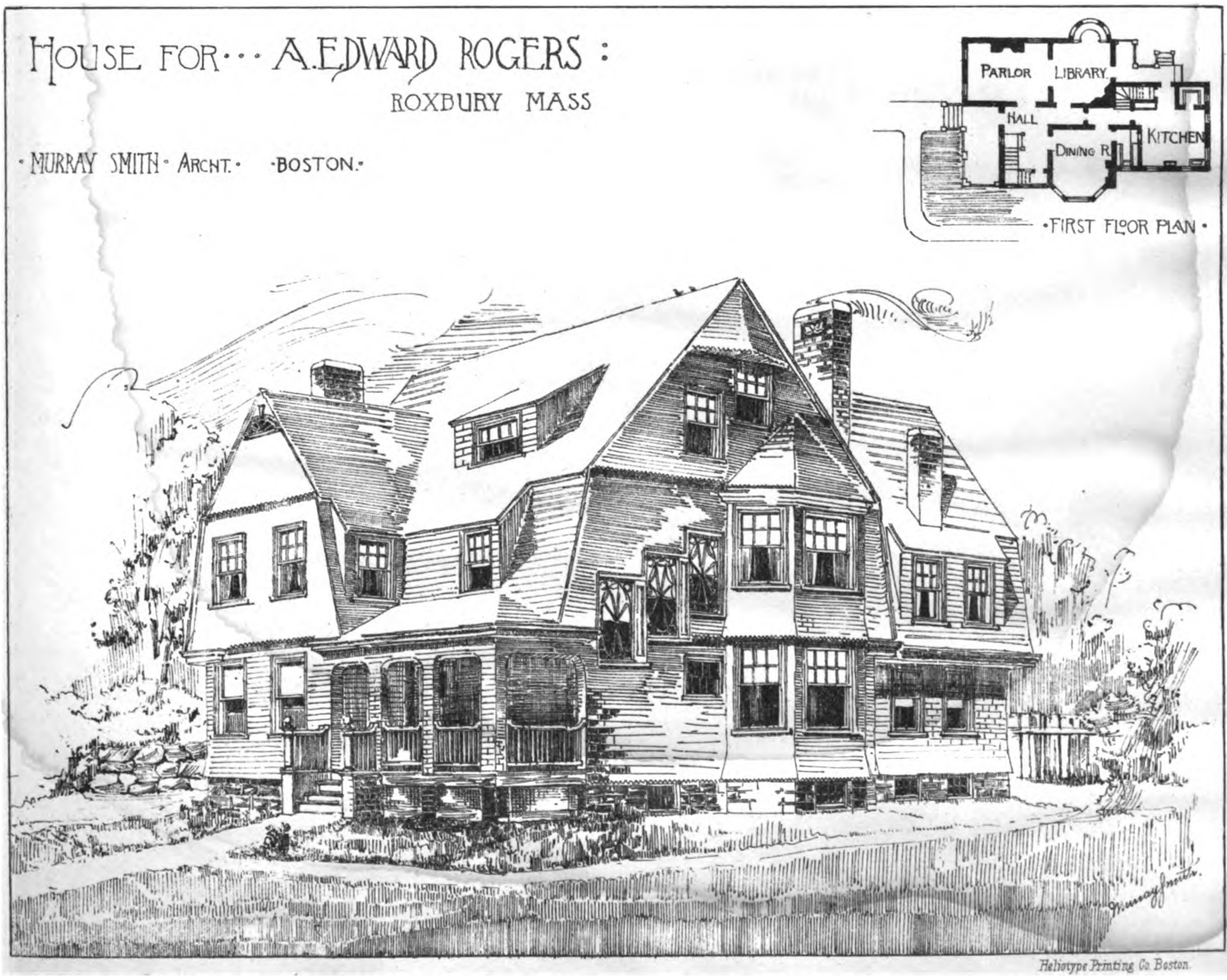

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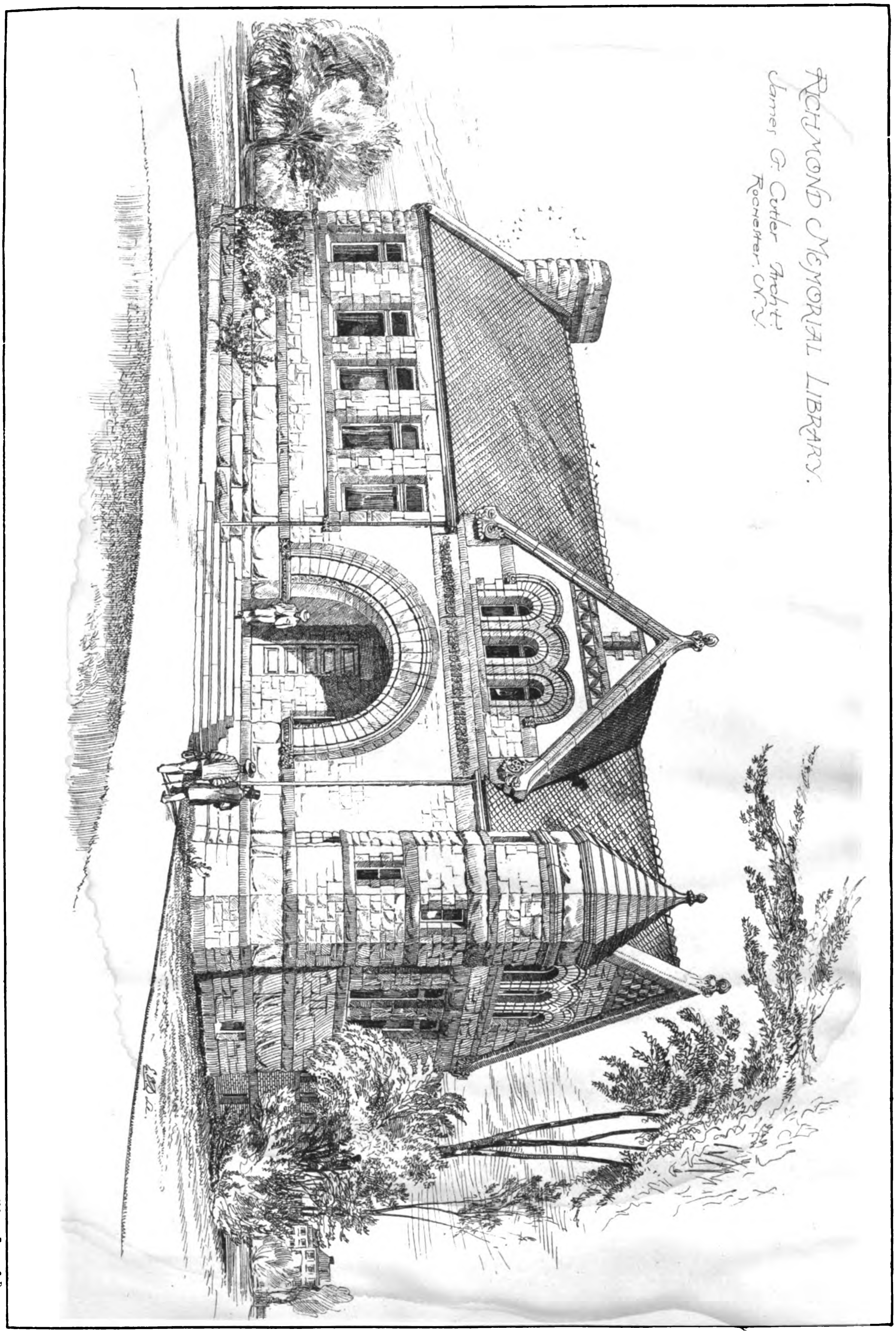

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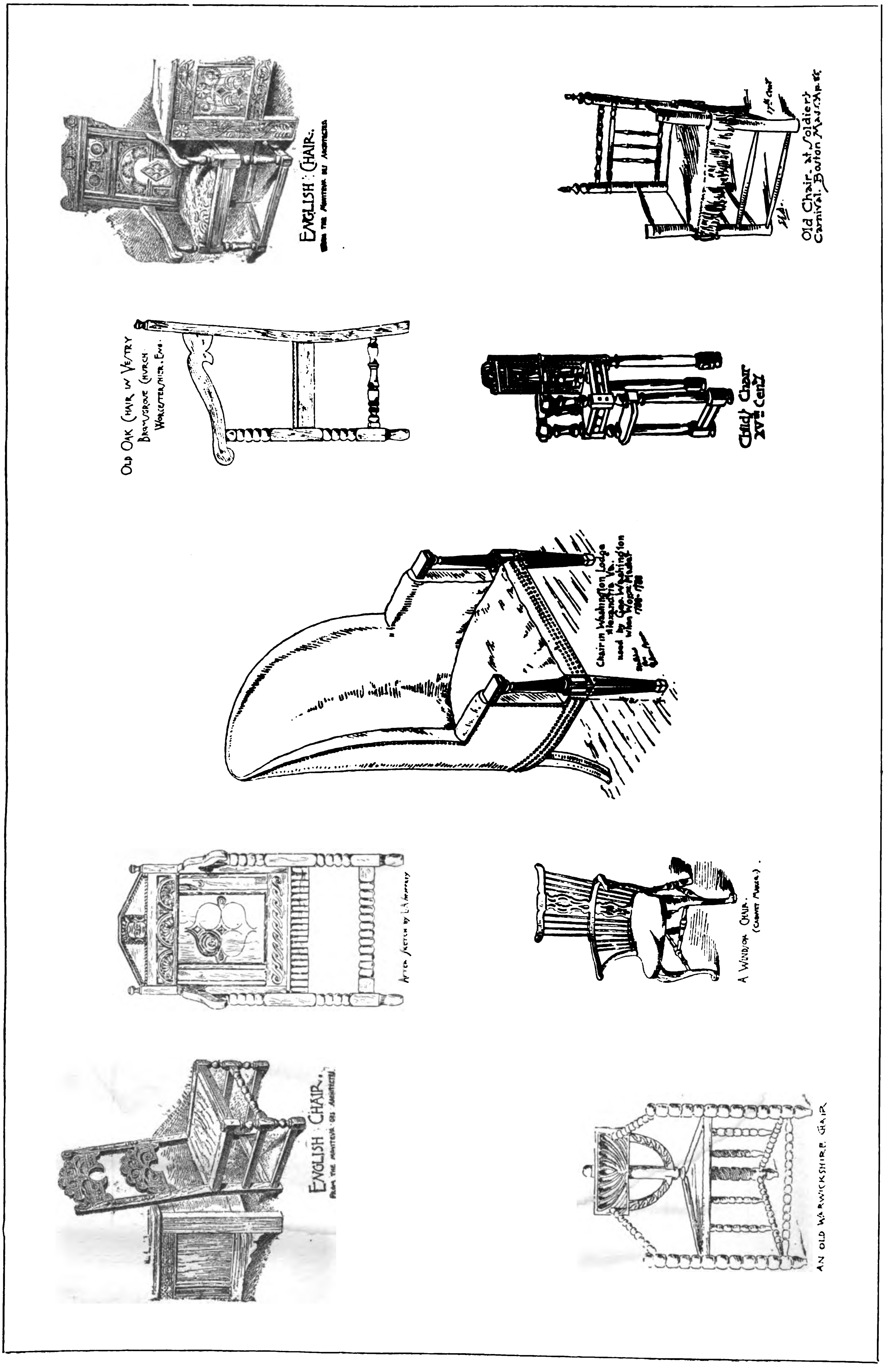
English Chair.
Old Oak Chair in Vestry
Bromsgrove Church
Worcestershire, Eng.
Old Chair at Soldiers'
Carnival, Boston Mass.
Child's Chair
XVII Cent'y
A Windsor Chair.
English Chair.
An Old Warwickshire Chair

CHAIRS.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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SEPTEMBER 29, 1888.

Entered at the Post-Office at Boston as second-class matter.

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MR. CHARLES W. WHITCOMB, the Fire-Marshal of the city of Boston, has just issued his Second Annual Report, which is as interesting as the first one. There is a special value to the observations of an independent expert on matters which are generally studied only in the interest of the insurance companies, and Mr. Whitcomb's statements in regard to incendiarism, and other causes of fire, deserve to be carefully compared with the statistics compiled by the insurance journals. For example, the insurance statistics present incendiarism as the cause of a large proportion of the fires that occur, while spontaneous combustion occupies in them but a comparatively small space. The Boston Fire-Marshal finds, however, that in the city under his charge there were last year more fires from spontaneous combustion than from incendiarism, and only an insignificant percentage of either. The "defective flue," moreover, that arch enemy of the underwriters, which is, we believe, credited in insurance statistics with being the cause of more than half the recorded fires, plays a very small part in Boston conflagrations. In fact, Mr. Whitcomb does not ascribe any fires during the year to this dreaded agency, as commonly understood, but classes together all the cases of fire arising from the ignition of wood furring placed in contact with chimneys, floor-timbers running into or near chimneys, or woodwork exposed to heat from a furnace or stove smoke-pipe placed dangerously near them, under the head of "Defective Construction," and attributes to this about four per cent of the fires of the year.

THE cause to which conflagrations in Boston are most commonly due is, we learn, not the "defective flue," or the machinations of the "incendiarist," but the misuse of matches, which are the source of twenty per cent of the fires. About three-fourths of these come from careless handling of the matches, either by children or by those who ought to know better, and the others are brought about by rats, which carry matches to their nests, and gnaw off the paraffine or paste at the end. It is a little startling to be told that rats playing with matches cause more fires than either defective flues or incendiaries, especially as many experts refuse to believe that rats gnaw matches at all; but Mr. Whitcomb settled this point during the year by putting three rats in a large cage, and placing matches in the cage at night. The floor of the cage was invariably found the next morning to be strewn with partly-burnt matches, and one of the rats actually gnawed the phosphorus end of a match held in the Marshal's hand until it was ignited, so that he considers his opinion as to their destructive ingenuity well founded. Although, as Mr. Whitcomb says, an "autopsy after cremation" is liable to some uncertainty, his method of investigation seems to be searching and accurate, and in certain special classes of cases, such as those due to incendiarism and spontaneous combustion, his observations shed a curious light upon subjects about which very little is accurately known. He acknowledges that the proportion of incendiary fires in the rural districts is far greater than in cities, so that the cases under his own jurisdiction afford only a partial view of the matter, but he has tried to enlarge his knowledge by investigations extended over the State, and has been led to some interesting conclusions. The most important of these is the opinion, which is entirely supported by his evidence, that the "moral hazard" about which insurance officials talk so much is very nearly a myth. An American insurance authority, he tells us, ascribes ninety-nine per cent of incendiary fires to plots to cheat the underwriters by over-insurance, and, in his first report, falling into the prevailing current, he stated that a majority of incendiary fires undoubtedly originated in this way. During the past year, however, finding reason to doubt the truth of even this moderate statement, he sent to the county prosecuting attorneys of New England, to the directors of penal institutions, and others, for information as to the motives which were shown by the evidence in trials for arson to have led to the guilty act. To his surprise, he found that, instead of over-insurance, the motive for the crime, in seventy-five per cent of the cases occurring through a long period of years, was simply a desire for revenge; while, of the remaining twenty-five per cent, about one-third were due to wanton mischievousness, one-third to general depravity, and only the remainder, about one-twelfth of the total number, to a desire to rob the insurance companies. In the cities, however, the proportion of insurance robbers is greater, and Mr. Whitcomb finds in Boston, as has been found in other cities, that a large part of them are Jews of the meaner class, to whom an attempt to insure worthless goods at a high valuation, and then destroy them, often seems a legitimate speculation. Although the honorable and upright Jews coöperate heartily with the authorities in endeavoring to put a stop to these frauds, they continue to be practised, and Mr. Whitcomb says that there are among the speculators men who make a business of setting fires for their over-insured friends, receiving payment by a commission on the amount of insurance collected. These useful individuals work, we are told, with some sort of "volatile chemical," which is to Mr. Whitcomb mysterious, but has the property, when scattered over the premises, of damaging the entire stock, although the fire may be trifling. We suggest that the "mysterious" chemical reminds us very much of a solution of phosphorus in bisulphide of carbon. This solution is very innocent in appearance, is easily scattered over inflammable substances, and produces no visible effect until the carbon bisulphide has evaporated: when this has disappeared, however, the phosphorus left behind begins to smoke, and soon bursts into a flame, together with the combustible object on which it has been sprinkled.

IN regard to spontaneous combustion, the fires of the year in Boston have furnished some new observations, of considerable importance. In one case, a quantity of feather dust in a bedding manufactory took fire without apparent reason. It was found, however, that a piece of thick glass had been lying on the feathers, and the sun's rays, concentrated in some way by the glass, had set fire to them, although the day was a cold one, in the month of March. In another case, a number of tarpaulin hats were lying, packed together, in a window. The high temperature, with, perhaps, the close packing of the hats, caused them to burst into a blaze. Two other fires were caused by putting paraffine paper, such as candy is wrapped in, into a refuse-barrel which contained a little sawdust; and a third, which destroyed twenty thousand dollars' worth of property, was occasioned by putting greasy paper, which had been used to wrap lunches in, into a wooden refuse-barrel, which happened to contain some sawdust and sweepings.

WE have before mentioned the scheme by which Messrs. C. A. Pillsbury & Co., the proprietors of the largest flour mills in the world, proposed some time ago to share their profits annually with their men. The plan was put in operation in 1884, and a considerable sum was divided at the end of the year. The next year was less prosperous, and at the end of it the Messrs. Pillsbury & Co., instead of a dividend, sent out a circular, explaining that there were no profits to

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divide; that their own capital had brought in no interest, and their work and care had been totally unrewarded, except by the consciousness that their men had been kept employed, and that no reduction in wages had been made. The next year there was no improvement in the business, and no dividend; but during the fourth year, which is just completed, the profits were large, and the firm has distributed forty thousand dollars among its employés, as their share of them. A flour mill does not require many hands, and the dividends vary, in accordance with the scheme by which they are reckoned, from twenty-five dollars to twenty-five hundred, but none of them are less than a month's wages, and some are very much more. The firm accompanies the dividend checks with a note, pointing out how the men, by trying to diminish the risk of fire, and keeping in mind the conditions of most efficient manufacture, may do still more to increase profits and avert losses, and announces that hereafter losses, as well as profits, will be divided among the men, to the extent that, if the year's business results in a loss, no dividend will be paid until this loss has been made good by subsequent profits.

ALTHOUGH most intelligent workmen, in discussing the profit-sharing systems, willingly accede to the idea that losses should be shared as well as profits, and consider it hardly fair or manly to accept one without helping to bear the other, it may be doubted whether it is wise, in most cases, to take this as a basis for such schemes. We think that the experience of most business men is that, while profits depend upon the slow growth of confidence on the part of customers, and on gradual improvement in processes of manufacture, and economy in administration, losses come most frequently on a large scale, through the folly or bad manners or morals of some one in authority. While the efforts of employés may do a great deal to save unnecessary expenditure, and increase and improve production, and thus make profits larger, they are of no avail against the dishonesty or bad business habits of a partner or confidant of the firm, and those who have done their best to earn profits should not be saddled with any part of the loss, if their superiors do not know how to make their work available. Although there are some profit-sharing establishments where losses are divided as well as profits, without allowing the men any influence in the management of the business, American workmen would not long submit to the reckless administration of a conceited and ignorant junior partner if they thought they were to suffer by it, and sooner or later the sharing of losses with employés would involve the sharing of management with them. We are inclined to think that this would be by no means an unmixed misfortune in manufacturing business, and that a veteran workman, who understands every detail of the manufacture, and has had to count his pennies all his life, and to spend and save with discretion, is likely to be as good an adviser in money matters as the college-bred sprig whose parents have bought him an interest in the firm to keep him out of mischief, or the "Napoleon of finance," whose genius lies principally in the size of the debts he can incur, but this view is not yet popular, and it is safest not to raise the question where it can be avoided.

WE imagine that most of our readers are rather at a loss to understand, from the unintelligible accounts in the daily papers, the exact nature of the charges which have been brought against Representative Stahlnecker, of New York, in connection with the Congressional Library building, and are now under investigation before a committee of Congress. In general, the movement against Mr. Stahlnecker appears to be a manœuvre on the part of the friends of Mr. Smithmeyer, the Library Commission, and the existing state of things, to meet the sudden assault made upon them by the opposing party a few weeks ago, and so far as we can see, the tactics employed appear to be about equally creditable on both sides. It will be remembered that the principal grounds of complaint which the House had against Mr. Smithmeyer, as distinguished from the Library Commission, under whose direction he worked, were that the execution of his design would cost ten million dollars, while the House had been led to suppose it would cost only three million, and that he had refused to use certain cement in the building which he thought was unsuitable, but which several other people thought was suitable. The answer to the first of these accusations was that as the Library building, according to Mr. Smithmeyer's plan, is to be three times as large as the State, War and Navy building, which cost three for our millions, it was obviously absurd to suppose that it could be built for the same price, and the delusion of the House on this point, if it existed, must have arisen from a misunderstanding of the estimate given by Mr. Smithmeyer and the Commission as to the expense of erecting a portion of the structure for temporary use; and the second was met by saying that Mr. Smithmeyer was, by his professional position in connection with the building, the final judge as to the cement to be employed in it, and if he did not consider the cement offered him to be suitable, it was his duty to reject it, no matter how many experts might have testified to its high quality.

THE counter-attack on Mr. Stahlnecker, who, as a member of the Library Committee of the House, probably had something to do with the assault on Mr. Smithmeyer and the Commission, also consists principally in two charges; the first being that he employed undue influence to persuade Mr. Smithmeyer to use for the building marbles from a quarry near his home, in which he or some of his relatives are alleged to be interested; while the second asserts that he also used undue influence to secure the adoption of inferior cement for the foundations. In regard to the first accusation, it appears to be reasonably certain that Mr. Stahlnecker went to the architect, and told him that in his district there was a quarry of marble, called Tuckahoe marble, superior to all others for the purpose of constructing just such buildings as the new library. He subsequently brought the agent of the quarry to Mr. Smithmeyer, and introduced him, and the pair joined in singing the praises of the Tuckahoe stone, and Mr. Stahlnecker strengthened his appeal by inviting the architect to make him a visit at his home near this admirable quarry, and informing him that he was on particularly intimate terms with Secretary Lamar, the Chairman of the Library Commission, and that the selection of the marble in which he was interested would be gratifying to this very influential person. As to the second charge, it seems that Mr. Stahlnecker came to the architect, and advised him "as a friend," and "in his own interest," to accept the cement offered by the contractor, which Mr. Smithmeyer had already rejected. The latter, of course, declined to comply with this advice, and explained to Mr. Stahlnecker that he must insist on having cement which fulfilled the requirements of the specification, and Mr. Stahlnecker departed; and not long afterwards came the startling onslaught in the House on the whole administration of the Library construction. The assertion that Mr. Stahlnecker or members of his family were concerned as owners in the quarry was fully refuted, and any member of Congress may naturally wish to secure a large contract for some of his constituents, so that it is not necessary to impute to him a corrupt motive to explain his importunity. Moreover, we have not seen any report that showed that any attempt had been made on the part of the quarry-owners to secure Mr. Stahlnecker's endeavors in their behalf by paying him a commission or lobbyist's fee. It is evident, however, that the methods of persuasion he did employ were such as to alarm the honorable instincts of Mr. Smithmeyer, who seems to have believed that he was dealing with one of those men who think they can bore or bully professional men into subservience to their schemes.

THE very latest intelligence in regard to the matter is that the Senate and House of Representatives have abandoned their quarrel over Mr. Stahlnecker and the Commission, and have agreed upon conditions of peace, by which Mr. Smithmeyer is to be sacrificed, and the construction of the Library building put under the direction of General Casey, of the United States Engineers. We have the highest admiration for Colonel Casey's ability and ingenuity, but we must confess that we cannot see how his conspicuous skill as an engineer is going to conceal the discreditable confession that the Government of this great country, which boasts some of the best architects and the most beautiful buildings of modern times, cannot get itself served by architects in whom it has any confidence; and, spending scores of millions upon the public architecture, is compelled to entrust its most important building—the most costly and important structure now in progress in the world, to the genius of an army engineer.

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EQUESTRIAN MONUMENTS. — VI.[1]

THE DARK AGES.

Odoacer.[2]

GOTH and Vandal are in these days synonyms for thorough-paced barbarians, and they doubtless fully earned their reputations, but they were not all bad nor all mere barbarians. The history of Italy under Odoacer and Theodoric shows that after a period of upheaval and tumult succeeded a season of comparative peace and quietness, and a revival in some measure of the polite arts, strongly flavored with Byzantine influences. Rome at this time was no longer the home of the alien rulers: their rugged natures demanded a more bracing atmosphere and found it at Ravenna, which in time became a rival in no small degree of the city on the Bosphorus. Odoacer was a mere military leader, to be sure, but he was a successful one, and the Roman practice of honoring such men with monuments had not become wholly obsolete in the peninsula, so that it is not surprising

Bronze Statuette of Charlemagne.[3]

that a people accustomed to being surrounded by works of art should, when peace was restored, on looking round and finding that the invaders had destroyed the familiar monuments of earlier days, seek to do something to replace them so far as their unaccustomed hands might do, and what more natural than to seek to curry favor with the despot by erecting a monument in his honor?

The accompanying cut from the "*Papiæ Sanctuarium*" (1505), by Jacobus Gualla, represents the so-called "Regisol" erected at Pavia upon a column or columnar pedestal of brick. To be sure, some authorities call it a Lucius Verus, others a Marcus Aurelius, others an Antoninus Pius, and again others an Odoacer, and for our purposes we prefer to accept this last supposition. At all events, the statue stood at Pavia until 1315, when it was torn down by the Milanese who had captured the city, broken in pieces and, seemingly, carried off as a trophy. The Pavians, however, duly appreciated this venerable landmark, and taking up a subscription succeeded, in 1335, in ransoming the fragments of the gentleman who had himself done so much damage to works of art, and patching the pieces together regilded the whole and set it up once more on its former pedestal where it remained until 1785, when it was temporarily dismounted and then restored to a new pedestal. It would have been still in existence had not the fates sent a new horde of modern Vandals into Italy — the French, who effectually destroyed the monument in 1796.

The identity of the equestrian statue of Theodoric, the Ostrogoth, that was originally erected at Ravenna, rests on somewhat better authority, for it is first mentioned by the Presbyter Agnellus in church records written about 838, about the time it was removed and carried off to Aix la Chapelle, where Charlemagne was building a magnificent palace into which were wrought all manner of columns and sculptures brought from Italy. It is supposed that Charlemagne, when he passed through Ravenna, after having been crowned by the Pope at Rome, was impressed by the beauty of this statue, and when he felt a need for something of the kind sent especially to Ravenna for it. As the Gothic king is described as wearing a shield on his left arm and brandishing a spear in his right hand, the statue evidently did not belong to the strictly Classic school, but seems to indicate that art had taken a new departure in the direction of realism.

It is not known just when this monument was destroyed, but it is thought that it did not long survive its removal to Aix, possibly falling a victim in the same century to the bigotry of the Catholics, who, perhaps, vented on the statue their distaste for the Arian doctrines upheld by Theodoric, notwithstanding that during his rule in Italy he did not meddle with the Romish Church and its practices. In support of this possibility may be cited a poem, a panegyric on Louis the Pious, the successor of Charlemagne, by Walafrid

Philippe le Bel, in the Choir of Notre Dame, Paris.[4]

Frabo, a monk, in the course of which the poet expresses the belief that this monument to an Arian was the work of the devil.

During the Dark Ages, when the Christian world was preparing for the final cataclysm, on the sufficient-for-the-day-is-the-evil-thereof principle, little heed was taken for the care and preservation of statues and still less for the production of new ones, so though the period between the fall of the Roman Empire and the dawning of the Renaissance was one which probably witnessed the disappearance of many a piece of sculpture[5] that would have added interest to this inquiry, we probably have to mourn the loss of few created within this time.

Whether or no during this debasing and filibustering period the peaceful arts had outside of the cloister any practitioners, and these any clients who cared to encourage them by entrusting to them commissions for large works of sculpture, it is certain that the Church kept the arts alive if others did not, and amongst the works of the

[1] Continued from No. 664, page 126.
[2] From *Jahrbucher für Kunstwissenschaft.*
[3] From the *Gazette des Beaux Arts.*

[4] From *La Croix's* "*Mœurs, Usages et Costumes au Moyen Age.*"
[5] THE DISAPPEARANCE OF POST-ROMAN SCULPTURE. — "As M. Justo Labārte so justly remarks: 'In the European museums there exist no works of the sculptor that have been attributed to this fair epoch of Byzantine art. Nevertheless it *does not seem possible* that of the immense number of statues cut under the rule of the successors of Constantine not one should have survived to us. One is tempted to believe that some of the works that have been preserved from destruction are assumed to be works anterior to the decadence of arts.'" — "*Histoire des Sculpteurs Français,*" *par Marquet de Vasselot*, 1888.

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churchmen must be sought the connecting links that unite the art-works of the Roman Empire with the works of the early Renaissance; and in the illuminated missals may be traced the continuance of the traditions that later found expression in the mosaics at Ravenna, and the crude sculptured work of early ecclesiastical buildings where the horse and rider were introduced, as in the sculptures about the doorway of St. Zeno, at Verona, where, on the right, is illustrated the chase of King Theodoric, a subject of some importance, for here, first, according to Maffei, a horseman is shown riding in stirrups. If, then, there were carvers capable of fashioning such work as this, there may have been others who did better and larger work at the same period, or even before.

The relics that in chronological order naturally next attract attention are to be sought in the ethnological museums of France, which have made a specialty of collecting Gallo-Roman remains; and though it is difficult to fix precise dates, probably many of the finds date from a period somewhat subsequent to the Roman domination. Amongst these are to be noted the rudely sculptured *stèles* which bear, after true Classic manner, the figure of the horse, the sepulchral emblem of the departing soul. Then, too, are to be noted amongst the household gods which the peasantry cherished, it is said, invariably, each hut having a niche or cupboard in which the tutelary deity was bestowed, certain mounted figures such as that shown in the annexed cut which represents the goddess of Agriculture or Abundance, which, from its distinctly Roman type, cannot be of very late date, and is credited to the fourth century.

The Goddess of Abundance.[1]

The thoroughness of the Roman civilization in the north of Europe, which is attested by the magnificence of the ruins of villas which are so frequently identified and uncovered in these days, is also proved by the vogue which the practices of the Roman religion also obtained, for relics that clearly show the impress of Classic myth are quite as common as Druidic remains, which they superseded in a measure. In the rude fragment, which is known as the Hercules of the Vosges, is a proof of the adoption of some obscure and possibly local myth which unites Hercules and the horse, here shown trampling on a human figure which terminates with a serpent's tail.

Hercules des Vosges.[2]

This trampling of a rider over a prostrate foe is common to sculpture of all times and peoples. The statues of Justinian, trampling on a Persian, and Probus riding down a figure of the Rhine, have been mentioned, and similar episodes are recorded in the bas-reliefs of Assyria and Egypt, but in no place is this incident more frequently introduced than in the carvings of churches of the eleventh and twelfth centuries, as at St. Etienne-le-Vieux at Caen, Sainte Croix at Bordeaux, St. Pierre, Aulnay, and at Autun, Parthenay-le-Vieux and elsewhere. Explanations of this symbol are as varied as there are instances. Now, it is St. George, St. Martin, or St. Michael; now, it is Pepin-le-Bref riding down Waifre, duke of Aquitaine; now, it is Charlemagne; and now the angel driving Heliodorus from the temple. But, perhaps, the most generally applicable interpretation is, that it represents the terrible rider of the Apocalypse with his dread white horse. But between these sculptures and those of Gallo-Roman times, lie centuries of whose work little is known, and less is left.

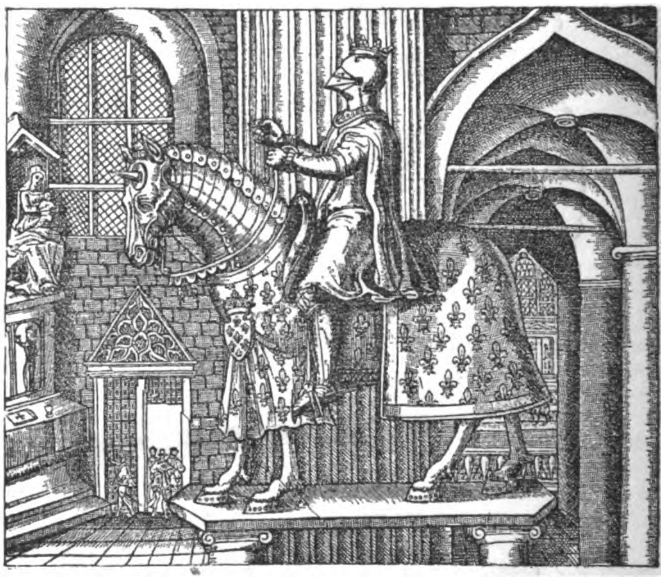
Cathedral Capitol.[3]

[1] After Du Cleuzions's "*L'Art National.*"
[2] After Ménard's "*L'Art en Alsace-Lorraine.*"
[3] After Du Cleuzions's "*L'Art National.*"

Perhaps the earliest equestrian statues of the Mediæval period which is known, and which, fortunately, still remains to us, is a bronze statuette of Charlemagne, now in the Musée de l'Hôtel Carnavalet, at Paris, and which is credited to the ninth century, and furnishes proof that secular sculpture was not wholly neglected; though it seems as if it could not have flourished with much luxuriance, since, in honor of the greatest potentate of his time, it seemingly could only produce this crude and miniature presentation. Of the early history of this statuette nothing is known, but Alphonse Vetault, who, in his "*Charlemagne,*"[4] credits it to the ninth century, gives some facts concerning its modern history. It was at one time preserved in the Cathedral at Metz, and later fell in some way into the possession of M. Albert Lenoir, and later formed part of an English collection, but finally was purchased by the City of Paris. After the Commune it was, in June, 1871, picked out of the ashes of the Hôtel-de-Ville, and, fortunately, was seen by some one who recognized it, so that it fell once more into the hands of the proper authorities, who, on the formation of the collections at the Hôtel Carnavalet, placed it there.

The general collapse of art during the ninth and tenth century[5] for one thing and for another, the fact that Charlemagne could not find any one sufficiently skillful to engrave for him a seal of state, so that he habitually used a seal engraved with a head of Marcus Aurelius, or another which bore the head of a bearded Jupiter, seem to make it doubtful whether it is possible that this statuette really is as early as the critics try to maintain.

But art does not proceed by great jumps and bounds; effort and struggle, trial and experiment, and opportunity, and practice are needed for its development, and between this work of the ninth century and the next early work of which, though now destroyed, there is good record, there must be many steps which have left no trace. Until 1772, there stood in the choir of Nôtre Dame, Paris, an equestrian statue of Philippe le Bel, eleventh ruler of the House of Capet, who caused its erection, it is



Philippe de Valois, in the Choir of Notre Dame, Paris.[6]

said, in fulfilment of a vow such as were so often made in those times by persons who, in a moment of bodily peril, vowed that, should they have safe deliverance out of their ill-plight, they would go on a pilgrimage to the shrine of Saint This, or bestow a silver candlestick upon Saint That; and as the story goes that this statue showed the king clad as when he repulsed the last attack of the burghers of Ghent and Bruges, that is, armed only with helmet, gauntlets, sword and shield, but without coat-of-mail or greaves, it looks as if he had been nearly the victim of one of the night attacks the stalwart citizen-soldiers were so fond of making, and being in sore straits vowed he would erect a statue in honor of Our Lady —— and to his own glory. The legend has it that on reaching Paris, he, still half-armed, rode his horse into the Church of Nôtre Dame, and there rendered up thanks for his escape, and in further token of his gratitude granted an annual allowance of one hundred pounds for the celebration of the anniversary of the event, and gave orders for the erection of his statue. A Latin inscription on the pedestal vouched for the truth of this legend and the scantiness of the King's armor; but a wood-cut published in 1575 gives the lie to both one and the other, for it shows the King in full armor, but without sword or shield, while horse and rider are quite obscured by the embroidered surcoat and caparison of holiday full-dress.

But the same story is told of a later ruler, Philippe de Valois, who made the vow at the battle of Cassel, in 1328, and caused the erection of the statue. Of this statue, also, there exists an early print, here reproduced, which in some ways seems most

[4] Published at Tours in 1877.
[5] "Nous trouvons une lacune dans l'histoire de l'art pendent les IXme et Xme siècles" — "*Historie des Sculpteurs Français,*" *par Marquet de Vasselot*, 1888.
[6] From "*Paris à travers les Ages,*" *by M. F. Hoffbauer.*

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deserving of belief. At any rate, this cut agrees most closely with the printed description of the statue. Replicas of this statue were also placed in the Cathedrals of Sens and Chartres.

VOWS.—"In the life of San Gallo we read that, in the time of King Pepin, a certain Willimar, being ill, promised, if cured, to offer a horse to the Church of San Gallo. Having recovered his health, he forgot his promise, but passing one day before the church of the saint, his horse stopped before the gate and by no possibility could it be induced to move on till Willimar had at last declared his intention of fulfilling his vow. In the life of St. Martin there is a rather gayer variation of the same anecdote. King Clodoveus, after having become a Christian, when fighting against the Visigoths, promises his own horse to St. Martin if he grants the victory to him. Having obtained it, Clodoveus regrets being obliged to deprive himself of his good charger and beseeches St. Martin to be kind enough to take money instead, offering him a hundred pieces of gold. St. Martin thinks the sum insufficient and asks for double, which Clodoveus gives, but, inasmuch as a little heretic blood still runs in his veins he cannot refrain from aiming a pointed witticism at him: '*Martinus, quantum video, auxiliator facilis, sed mercator difficilis.*'"—"*Zoological Mythology*," *by Angelo de Gubernatis.*

ODOACER, commonly called King of the Heruli. He was the son of a minister to Attila, the Hun, and in his youth went to Italy and rose to a high command. When Romulus Augustulus became emperor, the barbarian mercenaries demanded as a reward of their services one-third of the Italian territory, and on this being refused revolted, with Odoacer at their head, and after a short struggle compelled Romulus—the last of the emperors—to abdicate in 476 A. D. Although only a military commander, Odoacer governed Italy with full power, very justly and, in the main, peaceably until compelled to resist the inroads of the Ostrogoths under Theodoric in 489. Unable to oppose him in the field, he retired to Ravenna and there stood a siege of three years, finally surrendering only on condition that he should rule the country in conjunction with Theodoric. The promise was made only to be broken, for in a few days after the surrender Odoacer was murdered and his troops massacred.

THEODORIC, king of the Ostrogoths (455-526); sent as a child a hostage to Constantinople and educated at the court till eighteen years of age and then returned to his father. Becoming king in 475, he was for years the ally of Zeno the Isaurian, until the latter failed to keep his promises and war ensued, Theodoric ravaging the Byzantine territories at different times till at length he marched to attack Constantinople. Then the crafty Zeno pointed out how much better it would be to attack Odoacer and obtain the Western Empire for himself. Theodoric accepted the suggestion and marched with 200,000 men upon Italy and finally captured Odoacer at Ravenna in 493. Thanks to his training in boyhood he appreciated the arts of peace, and under him the country prospered in its internal and foreign relations.

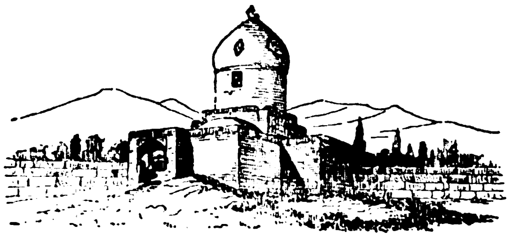
PHILIPPE LE BEL, eleventh king of the House of Capet (1268-1314). Secures by diplomatic trickery the surrender of the English holdings in Guienne in 1292, which he held until 1303. Because of the alliance between England and Flanders, he engages in a series of struggles with the Flemings, which continue till 1305, when the independence of Flanders is practically acknowledged. Engages in a contention with Pope Boniface VIII and his successors and finally accomplishes the removal of the seat of papal government to Avignon. He also accomplishes the dissolution of the order of Knights Templar and the confiscation of their property. His death is said to be due to the summons of the Grand Master Jaques de Molay, whom he burned at the stake, who cited him to appear, with the pope, before the judgment seat of God within forty days. Both pope and king died within the time named.

PHILIPPE DE VALOIS, fifteenth king of the House of Capet, 1293-1350. Raised to the throne through the action of the Salic law, which excluded the daughter of Charles the Fair. In consequence of the aid he gave Robert Bruce, King of Scotland, he became involved in wars with Edward III of England, who laid claim to the throne of France, and, making allies of the Flemings, carried war into France, defeating the French at Crecy in 1346. As an offset to his losses to the English he gained the province of Dauphiné. Married Blanche of Navarre in 1350.

CHARLEMAGNE, 742-814. Crowned emperor at Rome by Leo III, December 25, 800.

[To be continued.]

A NEW ENGRAVING OF DA VINCI'S LAST SUPPER.



Arab Tomb, after "*Les Arts méconnus.*"

THE first copies of Stang's engraving of the "Last Supper," which is on exhibition in the artist's atelier in Amsterdam, are being eagerly bidden for by collectors. M. Gaillard, who worked in competition with Professor Stang, died last year, so that the engraving adds the advantage of an undivided field of attention to its interesting claims as a work of very unusual worth. Comments upon it run too high and stormy as yet to tell where the final judgment concerning it will rest. That it is a noteworthy production is not disputed.

The print has brought up the subject of Leonardo's painting and the history of its decay. The want of data for the latter explains perhaps the insistence on the old and by no means verified story of the French troops, at the end of the last century, having used the refectory of S. Maria delle Grazie, on the wall of which the "Last Supper" is painted, as a stable for horses. Yet, how the picture, which is so high up that its lower edge is on a line with the cornice of a door, could be injured by animals standing below is incomprehensible. No accusation has been made that racks were built. Nothing touched the painting; no hay or straw scratched against it; it was too high to be spattered by effluvia. The only harm possible to accrue to it was from dust and the exhalation of the animals. That these must have been injurious elements is readily granted, but the indignation felt against the French must be modified by the reflection that the place is given over at all times to dampness, and it remains to be proved whether chemical disintegration of the painting follows more rapidly in the presence of animal transpiration than from the smoke and gas of tapers, the steam of hot viands, and from the other influences to which the picture was destined to be constantly exposed, as a decoration of a crowded dining-hall. The French occupation of Milan, moreover, was brief, so brief as to be ridiculous when compared, so far as injury to the painting is concerned, to the four centuries of dampness and time that has been silently but incessantly ravaging it. The incident can be legitimately mentioned, but it is folly to place too great an emphasis upon it. The painting in the beginning was an experiment, done in oil and not *al fresco*, so that it held in itself the elements of early decay. Vasari and Lomazzo both describe it as being, even in the middle of the sixteenth century, lamentably wasted. Since the beginning of our times the utmost care has been taken for its preservation, but all that piety has had for a century to preserve is a blotched and ghost-like vision. Not even the little that is still visible is all Da Vinci's; much is but the ancient and faded over-painting of his work.

So widely spread as engravings of the "Last Supper" are—more widely it is safe to say than any work of art in the Christian civilized world—not one is a production made direct from the wall as Da Vinci painted it. This, at least, is the opinion of careful critics. The finest and best-known engraving, that of Raphael Morghen, is known to have been completed after a copy of the painting by Marco d'Oggionne. That Professor Stang, at this late day, could engrave on the spot from the original painting alone was naturally sheer out of the question. His plan had to embrace an extensive study and comparison of materials in other places besides at Milan, for, after preserving, in accordance with the idea he started out on, what is possible to be yet discerned in the original wall-painting, there was yet to be gathered what is lacking from Da Vinci's sketches for the picture, and of supplying, when these means were exhausted, that which still remained wanting, by restorations of his own in the spirit and the style of the master. His reputation, fortunately, was already become so great as the engraver of "Lo Sposalizio," that he secured the facilities which were needed for his attempt. The municipality of Milan built the required scaffolds and set no limits to his examination of the substance of the wall, to his experiments for getting back of the over-painting to the ground, to his photographing of sections and use of lights; while he was favored by the Grand Duchess of Weimar, who considered the undertaking to be at last a rare promise of historic importance, and for the first time caused the drawings in her collection to be surrendered for use, and by the directors of the public museums in Venice, London and Vienna.

The original material for study consists of heads drawn by Leonardo for his painting, hands and feet, and sketches of the composition of the whole or portions. Of these the most important are the pastel drawings at Weimar, which include the studies of the heads of all but Christ and two of the disciples, all in good preservation and of more value than their common reputation, which was founded, not on the original drawing, but on bad photographs and prints of the drawings. The missing head of Christ exists as a red-pencil sketch in the Brera at Milan. The studies for Simon and Thaddeus have always been reported as being in an English collection. Professor Stang, however, exploded this tale. The drawings are not in England and he had to copy after Marco d'Oggionne in this particular like Morghen before him.

Besides the known studies for the hands and feet of the apostles in London, Venice and elsewhere, Stang had the fortune to identify three drawings, marked as "Of the Lombard School" that hang in the committee-room of the Academy in Venice, as original sketches by Leonardo for the "Last Supper." In the same collection and marked with the same unassumingness "After Leonardo Da Vinci's School," is one of the drawings which has been held to be an original by Leonardo for the composition of his wall-painting. It is in red pencil, shows St. John as letting his head fall completely to the table, and Judas, according to the old tradition, as sitting at the opposite side of the board from Christ. The deviations from the finished picture are striking; they can hardly be considered proofs, however, against the sketch being one of Leonardo's early conceptions. The expression of passion is so natural, direct and powerful throughout the composition, and to such an unsurpassable degree in John's sinking together, that some critics have always been inclined to consider the drawing the master's own, and in recent years there has been added as a weight in favor of its genuineness, the identification by experts of certain letters in the names of the apostles found written over their heads, with the same letters occurring in Da Vinci's handwriting. The Louvre study has never been questioned. It is held to be a leaf from a sketch-book. That Leonardo always carried such a book with him is known and this sketch it is reasonable to regard as a study from nature, taken while the artist was going about seeking ideas as to the composition of his picture. A table is denoted in it by two hasty horizontal lines. Of the group of men sitting about it, one, with legs crossed, leans his head upon his hand and listens devotedly to his neighbor. The latter points with his finger to the farthest end of the board at a man who, to hear better, leans forward over it. The connection of the scene—which, perhaps, took place in a tavern—with the thought in Leonardo's mind, is shown by a sketch of a head of Christ in a corner of the same leaf.

After these scattered studies had been copied and compared, there remained the necessity of selection and even of restoration. Da Vinci drew, for instance, several faces, like those of Christ and St. Matthew, without beards. He added these for the first time in

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the painting and here they are faint or wholly erased. Of the right hand of Judas and the left hand of James the Elder, several sketches exist, each a little different from all the others. But it is impossible to record the countless small points of difficult decision that came up. Several important and new discoveries were made by Stang that need to be noted.

The first of these is the fact that, contrary to what Morghen's and all subsequent prints exhibit, the back-ground of the original painting was light. Instead of the eye falling on the white stretch of table cloth, as we have got used to, it fell, in Da Vinci's picture, upon the dark figure of Christ. The air was the lightest colored portion; it was not toned, as Morghen represented it, to ease the lack of engraving. To the wonderful rythm and flow of line there existed in the original a rythm of illumination through the use of windows in the background, alternating with spaces of wall, so that the groups at the table were in darker and again in lighter outline. The differences in the expressions of the faces between those of the new engraving and Morghen's are too subtile for description in a concise description. Morghen's are weaker in characteristic. It is true that Leonardo modified. There are so many proofs of this that the very fact of St. John in the Venetian study being different in the direction of greater passionateness of expression than is found in the final delineation in S. Maria delle Grazie, goes far towards accrediting the sketch as Leonardo's. He studied from life and modified from a sense and an ideal of beauty and grace. Modifying, however, is not taming, and it is taming that Morghen is seen to have been guilty of. His mind and taste were possessed by the classicism of the time and this mistaken classicism caused him to stamp a sort of stereotyped mildness upon the expression of most of the apostles in place of the exquisite individualization of Da Vinci.

The discoveries made in respect to minor points were first that the table-cloth in the original was not wrinkled by multitudinous fine folds and that the salt-cellar, represented as overturned by the right arm of the frightened Judas, was an introduction of some late engraver inclined to *genre*. It is not found in the original painting, nor has it ever existed on the wall. Why Morghen, or rather, why d'Oggionne, should have introduced the folds it is in vain to guess. That they were studies from nature is quite probable. I once saw precisely the same singular spectacle which the cloth makes in Morghen's engraving, on an artistic tour, when our small steamer shipped a sea and the table was deluged with water from above, and again in Italy, where our hostess laid a cloth yet damp from the mangle. As the adornment of the table by dishes is plain in the "Last Supper," the richness of folds added a modest variety of line and small shadows to the stretch of flatness.

The size of Stang's engraving is one more point to be noticed in it, for, while having the same length as Morghen's, it is over an inch higher. Morghen was influenced to reduce his print to agree with an engraving of Guido Reni's "Aurora," with which it was exhibited. Stang's print, besides being an improvement, is in accordance with the proportions of the original, in which the ceiling does not press so near upon the heads of the apostles as is usually represented.

The whole length of time spent by Professor Stang over his work was within two years as long as that which Leonardo is said to have used in producing the original, or fourteen years — from 1874 to the present.

Countess v. Krockow.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

CHAPEL OF THE EPISCOPAL THEOLOGICAL SCHOOL, CAMBRIDGE, MASS. MESSRS. WARE & VAN BRUNT, ARCHITECTS, BOSTON, MASS.

[Gelatine Print issued only with Gelatine and Imperial editions.]

CITY-HALL, KEARNEY, NEB. MR. G. W. FRANK, ARCHITECT, KEARNEY, NEB.

This design was accepted after competition. The building whose estimated cost is $22,000, will be of pressed brick and Colorado red sandstone on two fronts.

RINDGE INDUSTRIAL SCHOOL, CAMBRIDGE, MASS. MESSRS. ROTCH & TILDEN, ARCHITECTS, BOSTON, MASS.

THE TOWER OF LONDON, AFTER AN ETCHING BY M. LUCIEN GAUTIER.

ENGINE-HOUSE NO. 15, DETROIT, MICH. MESSRS. DONALDSON, & MEIER, ARCHITECTS, DETROIT, MICH.

HOUSE FOR CYRUS H. K. CURTIS, ESQ., CAMDEN, N. J. MR. A. W. DILKS, ARCHITECT, PHILADELPHIA, PA.

ENTRANCE TO THE MOST HOLY REDEEMER CEMETERY, PHILADELPHIA, PA. MR. J. J. DEERY, ARCHITECT, PHILADELPHIA, PA.

CO-OPERATIVE BUILDING IN THIS COUNTRY.[1]

THIS subject is no new one to members of the Social Science Association. It was first brought to our notice in 1874, by the late Josiah Quincy, of Boston, who wrote copiously on the questions involved in that year and in 1875–6, and it was investigated by committees of our social science department from 1874 to 1879. Our first publication of the facts collected (in a report made by Robert Treat Paine, and the late John Ayres, at our Detroit general meeting, in May, 1875) attracted much notice, and was followed by several other investigations by societies and individuals. Our association continued the matter by a paper read at the Brighton meeting of the British Social Science Association in October, 1875; by an extended report read at our Boston meeting of January, 1876; by several papers (which were published) and a discussion at our Philadelphia meeting in June, 1876; and finally by reports at the Boston and Cincinnati meetings of our association in 1878. At this last named meeting, the facts concerning co-operative building associations in Cincinnati were ascertained, as they had been ascertained and made public for Philadelphia in 1875–6. Philadelphia was the first breeding-ground of these associations in America; they were introduced there, in a suburb of that city, about 1831, and by 1874 had increased in number to at least 400; while they had also spread into New Jersey and Delaware, and from Maryland had been transplanted into Ohio, but with a system of management in some respects very unlike that of the Philadelphia associations. In Cincinnati, in May, 1878, we found there were at least 15,000 members of these building associations, paying in weekly not less than $60,000; and this had been going on, and the associations had been increasing in spite of the "hard times," from 1876 to 1878. Meantime the building-associations of Pennsylvania and Michigan had been suffering from these "hard times," and from certain defects in their State laws, involving judicial decision unfavorable to the whole system. In the light of these facts the State of Massachusetts at the suggestion of Josiah Quincy, Gamaliel Bradford, Robert Treat Paine, and other members of our association, and with the hearty support of many persons of small means, who were desirous of forming such association, passed its act of 1877, defining and regulating "co-operative savings-fund and loan associations," as they were briefly termed by Massachusetts law. There had been much opposition in 1875–6, to the enactment of such a law, the old savings banks being fearful that these new organizations would injure them; but such has not been the result. Scarcely had the organic law been passed — May 14, 1877 — when, in July, 1877, the first of these corporations in Massachusetts, the "Pioneer Co-operative Bank," was established, with our former associate Gamaliel Bradford, as president, and D. Eldridge as secretary; and we now have from these two gentlemen — Messrs Bradford and Eldridge — a report on building-associations in Massachusetts, which practically covers the whole of New England, and may be summarized as follows:

In January, 1879, Josiah Quincy, writing to Mr. Sanborn, said: "The co-operate fund and loan associations are, I think, fully established in Massachusetts; there are a dozen in the State that I understand are doing well. The two in Boston (the Pioneer and the Homestead) have nearly 1000 members and loan $5000 or $6000 a month." This was nearly 10 years ago. To-day Mr. Eldridge reports in Massachusetts, 64 co-operative banks of which 13 have been organized since October 31, 1887. The 51 previously organized are reported by the State Savings Bank Commission as having 20,735 members, an average of 400 each, with 134,164 shares, and assets amounting to $4,211,949. The present assets of the 64 banks exceed $5,000,000, the yearly increase being nearly $1,000,000 in Massachusetts. Of these 64 Massachusetts building-associations, the Pioneer Co-operative Bank is the oldest, and presumably the richest. On the first of April, 1888, it had assets of $238,195.68 — an increase during the year preceding of $22,728, or more than 10 per cent. Its receipts during the year from all sources were not quite $150,000, of which more than $60,000 was from dues and fines. It had 776 members, with 59,955 shares, and 170 of these were borrowing members — a little more than one-fifth of the whole number; of its first series of shares, upward of 1700 originally, only 36 remained outstanding; while of the nineteenth series issued in October, 1887, 595 are outstanding.

[1] A Report from the Special Committee on Provident Institutions, read at Saratoga, September 7, 1888, by F. B. Sanborn, Secretary of the Committee, and published in the *Springfield Republican*.

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Of the other 63 banks, about 10 are in Boston, and the rest are well distributed through the cities and large towns of Massachusetts, there being 3 in Worcester, 3 in Taunton, 2 in Fall River, 2 in Haverhill, and 1 each in Lowell, Lynn, New Bedford, Cambridge, Chelsea, Somerville, Springfield, Holyoke, Westfield, Fitchburg, Waltham, Woburn, etc. Scarcely 3 of the 25 cities of Massachusetts are without such associations, while several of the large towns where skilled workmen are numerous, like Amesbury, Marblehead, Natick, Plymouth, Sandwich, Stoneham and Wakefield, have each one of these banks. They are now increasing in number faster than ever before, and seem to be on a good financial basis and well managed under a State law so good that it is taken as a model in other States.

In Maine there 10 or 12 of these associations, mostly organized within 5 years. In New Hampshire there are 4, all organized since January, 1887. In Rhode Island there are 8, the principal one being at Providence. In Connecticut there are 6 or 7 in different parts of the State, — 1 at New Haven, with a special charter, and the rest voluntary associations, without charters, at Meriden, New Britain, etc. In Vermont there is no law for such associations, and none are organized. In all New England, therefore, there are not far from 90 building-associations or co-operative banks, and they are fast increasing in number.

The largest proportionate number of these corporations is found in the five Middle States, New York, New Jersey, Pennsylvania, Delaware and Maryland; for it was in two or three of these States that they were first started, and have been spreading gradually for more than half a century. It was not until 1849, however, that the first incorporated building-association in Philadelphia was chartered; although 50 or more unchartered voluntary associations had existed there from 1831 to 1849. After 1849 their growth was rapid, for 148 were chartered in the 10 years, 1860–69 inclusive, 317 in the 6 years, 1870–75 inclusive. In 27 years, then, 692 building associations were chartered in Philadelphia alone, and at least 450 of these were in active operation in 1876, when the great Centennial Exposition took place in the city of Franklin. Probably in the whole country, at that time, there were not as many more in existence, for there cannot have been 900 such associations in the United States in 1876. There are now probably more than 1000, outside of Pennsylvania; and M. J. Brown, of Philadelphia, estimates the number in all Pennsylvania, now, as 900, — 450 in Philadelphia, and 450 in the rest of the State. In New Jersey there are probably about 140 associations; in Delaware 30, in Maryland 50, and in the State of New York at least 200. This would make more than 1200 such associations in the five Middle States.

It may be asked what amount of capital is invested in these associations in Philadelphia, and in all Pennsylvania. M. J. Brown has undertaken to answer this question, and his figures, though partly estimates, have great value. He examined the sworn accounts of 120 building-associations with the following results: Aggregate capital, $8,749,337; average capital, $72,911; aggregate shares, 151,680; average shares 1264. Applying this ratio to the other 330 Philadelphia associations, their capital becomes $32,810,017, and the number of their shares 568,800. It is, therefore, probable that in all Pennsylvania there are now nearly 1,000,000, shares in these associations, and that they represent a cash value of at least $60,000,000. The whole savings-bank funds in Pennsylvania hardly reach this sum, and when it is considered that the savings effected by the building-associations are continually passing out of their hands into those of the shareholders, in the form of occupied houses, it will be seen that the actual savings of these associations must be much greater than their capital at any one time. In 1876, Joseph Doren estimated this sum at $50,000,000 in Philadelphia alone, and by this time it must exceed $100,000,000, for mortgages were then making at the rate of 3,750 a year, at an average of $2,000 each. This would show an investment of $7,500,000 each year in mortgages, which in 12 years would be $90,000,000, and of this sum at least $60,000,000 must have been paid off by the natural operation of the system. It is therefore probable that $150,000,000 is none too much for an estimate of the now existing savings effected in Pennsylvania alone by the building-associations. No other State can probably show half as much.

New York has only of late begun to develop the system on a large scale, although some building-associations have existed there for more than thirty years. The old law, under which they organized was passed in 1851, and in the next year, 1852, the first Rochester association was organized and continued in operation for a few years. No other appeared in that city for nearly twenty years, when many sprang up which were used for speculative purposes, and checked the growth of the better kind, then so numerous in Pennsylvania. But in 1882 the Rochester associations began to "boom," as the phrase is, and there are now said to be eighty of them in that single city of Rochester, of perhaps 125,000. In Buffalo, with a population of 225,000, the number of building-associations is nearly as great as in Rochester, — the largest of these being the Erie Savings and Loan Association, which is less than five years old, but has issued more than 5000 shares of semi-annual series, and now receives more than $10,000 a year in dues and fines, and more than $8000 a year in premiums and interest. In the other cities of central and western New York, — in Elmira, Syracuse, Utica, etc., these associations have also been forming rapidly of late, and the Chemung Valley Mutual Loan Association of Elmira, has existed for thirteen years, and now has assets to the amount of $175,000, and about 450 shareholders. In the cities of New York and Brooklyn, new associations have been fast forming for two years past, and now for the first time the system seems to be actually planted in that great commercial and manufacturing centre.

The New York *Star* has been devoting a column a day to the explanation of the building-association system, and one of its editors, C. F. Southard, has prepared a small manual for the use of inquirers and of members of these companies. It is impossible to say how many of these associations now exist in the State of New York, but they must be counted by hundreds. Most of them are organized under the old and faulty law of 1851 (Chapter 122) and there is an unfounded impression that the more carefully drawn act of 1887 (Chapter 556) will somehow injure an association which organizes under it. At the State Conference of Building-Associations, held at Rochester, May 17–18, 1888, the impression seemed to be shared by a majority of the delegates from about 100 associations there represented. A small minority of the delegates believed that the associations should be examined by the officers of the State Banking Department, and it was over this question that the conference had its most animated discussion. A resolution calling upon the Superintendent of the State Banking Department to make such examinations was introduced but subsequently withdrawn, and no official action on the question was taken. The settlement of the great majority of the delegates was that such examinations, made annually or oftener, would be both expensive and useless. The law of 1851 does not provide for such examinations of loan-associations as are made of banks, but it does provide for an examination upon the request of not less than five stockholders, and it was claimed that this was all that was needed. It was further said that the business of the loan-associations is conducted publicly at regular weekly meetings, that the stockholders take an active interest in everything that is going on; and consequently opportunities for dishonorable practice are very slight. Finally, it was said that the law of 1851 has worked successfully for thirty-seven years, that losses by reason of failure have not equalled 1 per cent of the capital invested, and that the best policy is to let well enough alone. There is force in these arguments; but the advantages derived from State supervision and public report far outweigh the disadvantages, and any extension of these associations in any State should be accompanied with ample protection for the investors by frequent reports from some public office and State supervision of methods.

In New Jersey these associations have been reported on by the State Labor Bureau, from whose reports it appears that there are in the State no less than 140 building-associations, with a capital of $7,000,000 or $8,000,000. In Delaware they are also numerous, but chiefly in Wilmington and its vicinity. In Maryland they are chiefly found in Baltimore and its suburbs. The New Jersey associations began before 1847, but it was in that year that the State Legislature first recognized their existence. An act encouraging their formation was passed in 1847, another in 1849, and the latter, as revised in 1875, is now the State law on the subject. In 1880 the Labor Bureau began to report on them; in 1882 there were something more than 100 associations in New Jersey, with nearly 20,000 members, who owned 102,075 shares, and paid in dues about $4,250,000 annually. In 1885 these societies had increased to 130, and they may now number 150. It was estimated by the New Jersey Labor Bureau in 1885 that there were then in the whole United States 3000 building and loan associations, with 450,000 members, and an aggregate capital of $75,000,000. If this was so the capital must now equal $100,000,000.

For various reasons, some of which are stated by R. T. Hill, of Texas, in his report concerning provident institutions in the extreme Southwest, there have been few accumulations of savings in the form of money in the greatest part of the South. The number of savings banks there is small, and building-associations are recent and, as yet comparatively few. Mr. Hill estimates that there are fifty in Texas, which is probably more than in any of the former slave-holding states, unless Maryland be an exception. They are numerous in Missouri, and a few are found in Arkansas, Mississippi, Kentucky, Tennessee, Louisiana, Alabama, Georgia, the Carolinas and the Virginias. From these States, however, the committee have only scanty reports. There are twenty or more associations in the city of New Orleans, several in Atlanta, one in Georgetown, S. C., one at Key West, Fla., one at Pensacola, one at Selma, Ala., one at Fort Smith, Ark., one at Lafayette, La., one at Parkersburg, W. Va., one each at Yazoo City and Columbus, Miss., and no doubt many others in the above-named States. In Louisiana it seems that as long ago as 1873 a building-association was formed, which ran its course in ten years and divided its profits among the members. But the first of the existing New Orleans associations was organized in September, 1882, and has since been very prosperous, having now about 600 members, who have built or purchased more than 100 homes during the six years of its existence. Several others of the 20 or 30 New Orleans associations have from 300 to 600 members. In Tennessee the associations organized in 1880–81 and in 1885, in order to defend law to better advantage, formed a State union, which, at its organization, included six associations at Memphis, four at Nashville, and four or five others in different parts of Tennessee. There are now five or six in Chattanooga, which during seven years past

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have provided homes for 250 families, and in all Tennessee there must now be upward of 30 associations.

In Missouri the number exceeds 40, and may be much larger. An act passed in that State last year has led to litigation to test its constitutionality. The act in question was passed March 31, 1887, to govern the formation of these associations, and in many respects differed from the statutes then in force. The last enacted law claimed such associations to be benevolent associations, and consequently exempt, as mentioned in Article 10, Section 21, of the State Constitution, from the payment of tax on the capital stock, there being already an article in the statutes of 1879, governing the formation of benevolent, religious, educational and miscellaneous societies, which under the constitution were exempt from payment of said tax on their capital stock when incorporating. The Secretary of State was of the opinion that this part of the act of March, 1887, was void, and declined to issue certificates of incorporation until the tax on the capital was deposited with the State Treasurer, to be held until the determination by the court of the question of the legality of that part of the act of 1887. Under this arrangement 34 associations deposited with the State Treasurer the amount of the tax on the capital stock, aggregating $6608. If the court sustains the associations, this money will be returned to them. This question in Missouri was earlier raised in New York, and has there been practically decided against taxation, because in that State savings banks are not taxed. There are States, however, such as Massachusetts, where savings banks are taxed, and there seems to be no reason why building-associations may not be, should the pnblic good require it. We are inclined to estimate the whole number of building-associations in the former slave-holding states, exclusive of Delaware and Maryland, at 200, but they are fast increasing.

In this section of the country, Ohio, and especially Cincinnati, was the pioneer in establishing building-associations. Dr. P. A. Keck of Cincinnati has the credit of beginning the first one in that city in 1867, where there are now perhaps 100. Three years ago Dr. Keck wrote an account of his work in Cincinnati, in course of which he said : "There are too many building-associations. At the time I started the system I thought that five or six societies would be enough for the needs of the people of this city, but now there are so many that I think a great many people suffer by it — the butcher, the baker, the doctor, the tenant, the landlord, and almost everybody else. Some of the members of the associations, instead of paying their debts, put their weekly earnings into these associations and get their dividends every year. It is my opinion that societies nowadays pay too much in the way of salaries and current expenses, such as the purchase of safes, etc. The object of such associations is the saving of small amounts by individual members, and the current expenses of the society should be reduced to the minimum figure. When I started the first society here, we paid our secretary $1 a night, and afterward $2. Now secretaries are paid $5 a night, and even that amount is not considered enough by some people. The whole number of these associations in Ohio can only be guessed at, for the Cincinnati member of our committee has been unable through ill-health to collect the scattered statistics. There are about 400 associations in that city alone — or at least in Hamilton county — and in Dayton, Toledo and many smaller cities these societies exist. It is supposed that Ohio stands next to Pennsylvania in the number of its building-associations, and that they exceed 600 in Ohio, while there may be 1000 in Pennsylvania, large and small. In Cincinnati the shareholders are estimated at 75,000 and the amount of weekly payments of all sorts is reckoned at $1,500,000. A further estimate gives $300,000,000 as the amount invested in Cincinnati by these associations in 10 years; but this is probably excessive. They far outstrip the savings banks of Cincinnati in the amount of their investments, however, and in the number of their depositors. The majority of these are Germans, or of German descent, but there are also Irishmen, Americans, negroes and men and women of every race among them. The Ohio law was amended in 1886, after much discussion, but the financial system there pursued is open to some criticism from Pennsylvania and Massachusetts."

Illinois comes next to Pennsylvania and Ohio in the number of its associations, there being nearly 300 in Chicago alone, and exceeding 400 in the whole State. The valuable report of Professor Jenks of Galesburg, and the unique schedule prepared by him with great labor, throws more light on the operation of these Illinois associations than his modesty has allowed him to mention. It appears that the 200 or more associations in Chicago alone have a much higher average number of shareholders than the 250 or so which exist in the rest of Illinois. Thus, while 16 Chicago associations average 589 shareholders, of whom 164, or more than 26 per cent, are women, the 37 associations outside of Chicago average only 244 shareholders, of whom only 54, or but little more than 22 per cent are women. The loans to members in 24 Chicago associations average in a year $210,690; while in 53 other Illinois associations they average only $62,002. The average loan to a member in Chicago is $1329, in the rest of Illinois, $710; while the whole amount of Chicago loans in 24 associations is $5,056,578, and in 53 outside associations $3,286,092. It is probable that the most prosperous associations made reports, so that the average of loans to the amount of $108,350 in each association is doubtless too high for the whole 450 in Illinois. But if we call the average loan only $80,000 in a year, this would give for Illinois alone an aggregate of $36,000,000 as the yearly amount lent to shareholders by these associations. This is twice the amount of savings-bank deposits in the State, according to Professor Jenks, while the building-associations are increasing their business much faster than the savings-bank business of the bankers of Illinois is increasing.

The early building-associations mentioned by Professor Jenks as existing from 1849 to 1869 were rather speculative real-estate companies than co-operative loan-associations after the Pennsylvania model. Such began to be formed in Illinois after 1869, and the oldest now in existence dates from 1874. It was about the same time (1870–72) that the building-associations in Missouri began ; and probably Indiana, lying between the two States of Illinois and Ohio, did not have building-associations much earlier than 1870. The number in that State can only be estimated, and our member, Mr. McCulloch, does not attempt to guess at it; but we may set it down as between 100 and 200. From Iowa we have no returns, and cannot reckon her building-associations at more than 100. The first was formed at Burlington in 1870, the second and third at Keokuk and Oskaloosa in 1872.

Michigan seems to have had an earlier experience with these societies, and one which for some years previous to 1875 gave the legal and financial leaders of that State a very unfavorable impression of their nature and results. Consequently the State law of 1877, under which perhaps 15 or 20 building-associations now exist, was far less favorable to their formation than the laws of Pennsylvania, Ohio, and finally of Illinois. This state of things was changed in 1887, by the passage of a law more satisfactory to the association members than the old law had been. Under this new law about 40 new associations have already been organized, so that the whole number in the State may be about 50. Laverne Bassett, of Ann Arbor, who has collected what information he could (in place of Professor H. C. Adams) about the Michigan associations, gives their average membership as 180, and their "average authorized capital" as $2,367,000; one of them having an authorized capital of $5,000,000, while a new and small association has but $100,000 nominal capital.

Minnesota though later of development than Michigan, has a much larger number of building-associations — probably not less than 125 at present, and fast increasing. A well-known journalist, Albert Shaw, of Minneapolis, writes, in the "*History of Coöperation in the United States*" (published at Johns Hopkins University), the following statement: "Several of the most flourishing building and loan associations to be found anywhere in the country are established in the neighboring cities of Minneapolis and St. Paul; and they have been the means of providing many hundreds of workingmen's families with pleasant homes of their own." He mentions eight of these associations in Minneapolis, the first of which began in 1874. In the whole State of Minnesota, as we are informed by a citizen of St. Paul, there are nearly 120 of these associations, and nearly or quite 50 of these are at St. Paul. Probably Minneapolis has 20 by this time. From 8,000 to 10,000 homes in St. Paul have been secured to their occupants by this new system of borrowing and guaranteeing. Whatever the figures of invested capital may be, they are changing so fast, from one day to another, that they give little real indication of the present state of things, still less of the accumulations that have really been made under the method of saving. As an experienced writer (M. J. Brown, of Philadelphia) says:

"It is fair to suppose that about one-half of the income received by building associations for dues, etc., is now being laid out on account of matured shares and withdrawals, for many of these societies are now maturing series of shares every six months or every year. The capital increases largely until the shares begin to mature, but when that point is reached, new shares admitted from year to year do not contribute any more than enough capital to take the place of the older retiring shares. In the Philadelphia associations the cash income is more than half the capital, which would indicate an enormous capital growth; but the outgo is largely for matured shares and withdrawals, resulting in almost a fixed sum for the capital. This is really a factor in favor of the societies, for they are now distributing millions of dollars every few months to the members who have been saving for years for some cherished object."

What is true of Philadelphia has long been true, in this respect, of Cincinnati, and is now true of Chicago and St. Paul. The number of associations reported in the last named city three months ago was 45 with an average of 3,000 shares in each one, and an average value of $50 a share. Assuming that this is true of the 120 in the whole State, this would give an investment of $18,000,000 in Minnesota alone; but this may be an over-estimate. The deposits in Minnesota savings banks hardly exceed $5,000,000, and the rapid growth of these associations has certainly checked the growth of savings banks there, as it has in Rochester, N. Y., in Buffalo, in Pittsburgh and in every State west of the Alleghanies.

From Wisconsin we have no information leading us to suppose that there are 50 building-associations in the whole State, although they began there in 1882 or earlier. In Minnesota, they began in 1869, though their great development has been since 1880. They exist in Nebraska, in Dakota and Montana, but from these we have no returns. In Kansas they have lately made a very rapid growth, and now exceed 100 in that State.

California has had these associations for some years, and for a time maintained a monthly newspaper devoted to their interest. In 1887 there were in California 11 building-associations with 30,000 shares and with assets of $2,595,488. This indicates large operations for each society, and points to a speculative element in the

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California associations, which is very apt to appear in that State or elsewhere when real-estate speculations are going on actively. The reports of some of the California societies show average loans of $2,000, which is much above the Chicago rate, and, we believe, higher than the Philadelphia rate. But we have nothing to prove that the California business is unsafely done; and there are few States where there is greater need of some method to increase the number of small estates owned by their occupants. From the other Pacific States and Territories we have no returns at all.

From all the information attainable by the committee, there is no reason to doubt that there are now 3,000, perhaps even 3,500, coöperative building and loan associations in the United States, and that they provide for the investment, at any given time, of not less than $300,000,000. The accumulated investments in the form of houses and land, which have been paid for by the occupants or their families through the medium of these associations in a long series of years, must be much greater than $300,000,000. Twelve years ago Mr. Doren, a competent authority, estimated this accumulation at $100,000,000 for Philadelphia alone, where the annual payments then exceeded $7,500,000. There must, therefore, be an accumulation in Philadelphia alone at this time of $180,000,000 at least, and in the whole country there are now more than six times as many associations as in Philadelphia. We may, therefore, safely estimate the whole accumulations made by the aid of building-associations at from $500,000,000 to $750,000,000 in a period of 40 years. The savings banks of our country have provided for much greater accumulations in the same period, but it must be remembered that they are much older than the building-associations in the wealthiest portions of the United States. At the rate the building-associations are now gaining, the time may come when their accumulated savings at any one time will exceed those of our savings banks, immense as Mr. Townsend's report shows that they are and will be.

It is doubtful if any system for savings has ever been devised which has such a tendency to produce a frugality among persons of small income as the building-association methods. There is nothing to repel and everything to attract such persons who are paying rent or board, and wish to avoid doing so. Borrowing, which in the ordinary form is apt to discourage or demoralize the poor man, is here an incentive to industry and economy, for he must earn and save money to keep up his investment, from which he is taught to expect greater profits than are usually returned to him in cash. But the return he gets in relief from rent-paying is itself a profit, which also appears to his imagination greater than it commonly is. The excitement of betting, the pleasure of house-building, the companionship and competition which he finds in belonging to such a society, all lure him forward in the way of economy. There are drawbacks and there are dangers in these petty financial ventures which in the aggregate are so vast; but these are no more than attend the usual investments of money. We must, therefore, expect such associations to increase in number and to absorb more and more of the earnings of the people, just as life insurance absorbs more and more of the surplus income of classes a little more prosperous than those who make up the great body of shareholders in the associations we have been enumerating.

THE LIFE OF AN IRON ROOF. — The Cincinnati Corrugating Company have obtained some valuable information from Mr. W. A. Meninger, of Covington, Ky., who has had upward of thirty-five years' experience in the roofing trade in that vicinity, on the life of an iron roof. Mr. Meninger stated that in 1856 he put up a corrugated-iron roof on what was then known as the Clayton Young House, at No. 33 West Fifth street, Covington, which is now occupied by the Sisters of Notre Dame as a school. This roof did first-class service and gave good satisfaction until about ten years ago, when, upon some changes being made in the building, it was taken off. The material composing it has since been sold to different parties and is now in use for covering various sheds, stables and other small buildings in Covington and vicinity. In 1861 Mr. Meninger covered the Charles Whitcomb House, adjoining the Fourth Street Presbyterian Church, with corrugated-iron. This roof is doing perfect service to-day. The expense for repairs, and even repainting, had been hardly worth mentioning. In 1863 he put a similar roof of corrugated-iron on a brick building erected for Mr. George Phillips, who then owned the property, the lot being now occupied by the Fourth Street Presbyterian Church. Mr. Phillips manufactured and prepared the materials himself in his rolling-mill. The building has been used as a dwelling house most of the time since then, and this roof has answered its purpose admirably. It is now in a remarkably good state of preservation, considering that it has had no attention in the way of repairing for a number of years. Mr. Meninger also cited the history of a number of old-time iron roofs with which he is personally acquainted. The old Howe warehouse on Market space had over it for over thirty years an iron roof. After affording complete protection for this long period, and over an almost flat surface, it was removed about three years ago. The Licking Rolling-Mill has a corrugated-iron roof which has been on it for over twenty-five years, and to Mr. Meninger's certain knowledge, it has never had a coat of paint since it was first put on. The Kentucky Central Railroad shops in Covington were originally furnished with a corrugated-iron roof, which remained for over 23 years in a good state of preservation, and was only recently removed on the occasion of some repairs and changes. — *Iron Age.*

MEDIÆVAL HOUSES.[1] — IV.

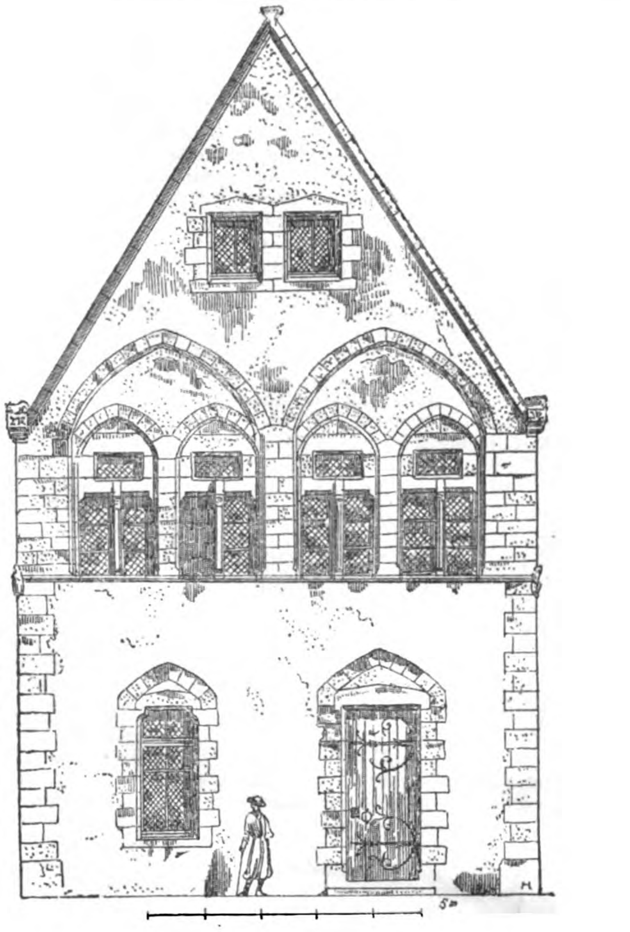

Fig. 16.

FIGURE 16 gives a front in Provins in the Rue de Paris, dating from the second half of the thirteenth century. Here the inmate shut himself up from the outside world. The *salon* and chambers are on the first floor, the ground-floor being reserved for common household uses, for provisions, the kitchens, etc. The stories are high between floors.

Evidently, life in these dwellings was broadly simple. Great care was bestowed upon construction, the openings were strongly arched in stone, and the façade, though made up of very few elements, wears a monumental character. They knew how to put art into a rough stone-wall simply pierced with openings, without decorations, without expensive construction, and conforming itself to strict necessity. Does not this predicate a very advanced social state and the highest point of art, and can we say as much for our own century? For a great number of people to-day, art is only one of the expressions of luxury, a mere superfluity; and, to them, a front not covered with columns or pilasters, with mouldings and ornamentations in the fashionable style, is by no means a work of art. The Middle Ages have left us very few books or discourses on the subject of their architecture, but they have built with equal art the richest structures or the humblest dwellings, loving and respecting art in its modest expressions, as well as in its most splendid conceptions.

A century which manifests its taste by multiplying ornamentation and increasing expenditure, daily neglecting the first principles of art, taking up one style after another and originating nothing, is only hastening the decline of art.

The palaces and monuments of to-day display wealth of ornament without order or reason; while the smaller houses are rough in workmanship, ridiculous, uniformly vulgar, and with sins of construction which usually find a speedy retribution. The only consolation which remains, in the midst of these miseries, to a lover of art, is a belief in the better judgment of posterity.

When art becomes only a thing of luxury its end draws near. In the Middle Ages the vital power of art was manifested everywhere; its expression was a want shared by great and small. The old houses which still filled our French towns a few years ago and which new wants have rapidly dismantled, were a living proof of this assertion. We do not pretend that at the cost of the public health and in the face of the prosperity of the middle classes, the old order could have been preserved, but we would like to find in our own private building such signs of a population loving art and striving to spread everywhere its true expression. But in the rich old Gallic blood, which, freed from long repression, coursed through the veins

[1] Translated from the French of Viollet-le-Duc, by Mr. A. B. Bibb. Continued from page 115, No. 667.

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of the thirteenth century carrying life into all the provinces, covering the soil with structures of all kinds, original, logical, free, fit dwellings for a nation full of brilliant qualities — this blood, clear and pure, has been enslaved again under a second invasion of strangers; it has become once more Roman, and under such Romans! Symmetry has replaced logic; the phanton of a dead art stands in the place of the native originality of our country. False methods, persistently taught, have taken firm root, and an infatuation, which no one comprehends and no one explains, because it cannot be explained to minds naturally clear and logical, has replaced the innate taste for that pure art, in the midst of which we feel at home. The house of the Middle Ages in France is the dwelling of one born upon the soil. The house of our day is a stereotyped dwelling, alike for the lawyer, the soldier, or the lady of fashion, and uniformly inconvenient for all. There can be no comfort in such houses, and the passer-by observes only that the fronts are nearly identical and that we ought already to be dead of boredom, if that malady were ever fatal in France. But there is still hope in the fact that our time is not the first wherein they have tried to mould, let us say, the dwellings of a city into the semblance of a lot of boxes set in a line and exactly alike in shape. The rulers of the Middle Ages understood little better than our modern magistracies the canons of art, but they did not hinder the nation from developing its talent. The English rulers especially do not seem at this period to have appreciated the French talent, but in their position as strangers they were perhaps excusable. "In the last half of the thirteenth century, a time of peace and prosperity," says M. Felix de Verneilh, "a little corner of one of the provinces was covered rapidly by new towns called, in the ancient language of the South, 'bastides.' Alphonse de Poitiers, brother of Saint Louis, had become, through his marriage with the heiress of the Counts of Toulouse, the nominal Lord of a part of Guienne." As such, and notwithstanding that this sovereignty was often reduced to a mere title he endeavored to secure his direct authority by building a capital city, Villefranche de Rouergue. "In Agénois he founded Villeneuve d'Agen and several less important 'bourgs.' In Perigord, where he had some possessions, he also built 'bastides.'" These walled towns or "bastides" were built on ground given gratuitously, laid out after the plans of engineers, and enjoyed a liberal franchise. By this means he brought entire populations under his rule, and the scheme succeeded notwithstanding the protestations of rulers and the excommunications of the bishops.

"On his part," continues M. F. de Verneilh, "Edward I as duke and afterward as king, multiplied endowments of this character, which are among the best claims of this great prince on the remembrance of the ancient duchy of Guienne; Libourne, among others, owes its existence to him (1286) . . . ." Beaumont was also built for the profit of the King of England in 1272; Marshal Jean de la Linde commenced on his own domain the bastide of La Linde. The town of Montpazier was built in 1284.

The plan of Montpazier has never been altered. Like all the towns of this period in Guienne and Perigord, the town of Montpazier is not only laid out with perfect regularity, but all the houses are of equal dimensions and similar plan. A group of these houses (Figure 17) shows with what cellular uniformity they were built. The regularity observed in modern towns, such as Napoleon-Vendée and certain towns of Algeria is mere disorder as compared with this absolute symmetry. It would seem that all the people who came to live in these free "bastides," which were a sort of refuge offered by the sovereign, stood upon an equal footing; however that may be, it is certain that they submitted to levelling conditions of fronts and ground-plan, since these towns were built all at once and had attained a very high relative degree of prosperity soon after their construction. From which it would appear that those ideas which are generally supposed to belong to our time, to "working cities," and to centres of population established on a basis of absolute equality, are not new after all; and that the Middle Ages had even attained a practical application of them far beyond what we have done.

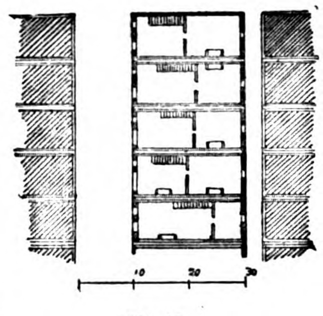

Fig. 17.

However modest these dwellings may have been, they were, at least, suited to the wants and habits of the period. They were all composed of a ground-floor, a first, and sometimes a second, story; their fronts were varied according to the tastes and fortune of each one, and they were well built and solid. The "place" of a town, on one side of which was usually built the market-house, was surrounded by low, wide porticos, terminating on the streets giving entrance to the "place;" the engineers who laid out the plans of these bastides were very careful not to cut streets debouching upon the middle of sides of this square, which would perhaps have conformed to academic rules, but not at all to those of reason. A "place" is generally an area, more or less broad, where the people meet; if two streets cut the centre at right angles, it is clear that the people passing would crowd those who rested there. To establish travel around the sides of a "place" and leave the middle free was the scheme upon which the planners of mediæval towns proceeded. Corners were cut off the houses at the angles of the squares, to allow vehicles to enter the "place" easily on market-days. Figure 18 is a plan of a quarter of the "place" of the bastide of Montpazier, and Figure 19 is a perspective view of the entrance to the "place," taken from the point *A* of the plan, showing how the angles of the houses are carried on corbellings over the cut corners which give a diagonal entrance to the "place."

The houses of these bastides at the end of the thirteenth century were built of stone, brick or rubble masonry. Wood was not used for the fronts. Wooden houses were very rare in the Southern provinces, though from the end of the thirteenth century we see them becoming more and more frequent in the provinces of the North. First, only the upper story was built in wood, then soon the ground-floor alone was in stone; and, finally, during the fifteenth century and the commencement of the sixteenth, the entire fronts were not only built in wood-panelling, but often entirely covered with boards, like great pieces of furniture, without an apparent trace of masonry. Over and above the taste which the people of the North have always preserved for wood-construction, and the influence which the traditions brought by the Northern invasions from the great forest lands exercised on the people, wood-construction presented advantages which attracted all the inhabitants of the populous towns of the French provinces, properly so-called, to the employment of this method. In the large cities of the North, such as Paris, Rouen, Beauvais, Amiens, Troyes, Caen, etc., the "place" was rarely found. As these walled towns could not grow by spreading out as in our day, they tried to gain in height the space they lost in the ground-plan, and the houses encroached as far as possible upon the public street by projecting the upper floors on corbellings. Wood-construction alone lent itself easily to this arrangement, imposed by necessity. The fronts were sheltered by overhanging roofs, whether they built guttered fronts or gables on the streets. The thoroughfares becoming narrower and narrower as the cities became richer and more populous, the windows were enlarged so as to obtain the greatest possible amount of light.

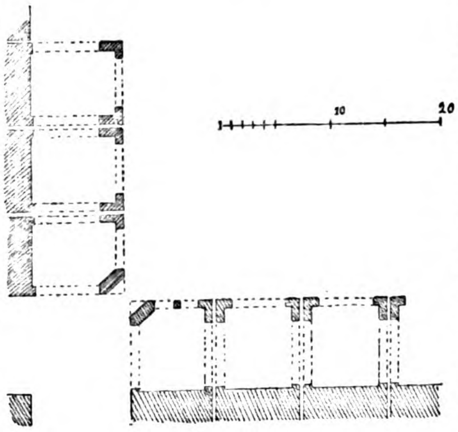

Fig. 18.

Fig. 19.

It is worthy to note that while in our time, and with good reason, we try to gain plenty of light for our rooms, the oldest Romanesque houses had comparatively narrow windows which admitted very little light, the inhabitants seeking darkness in their interiors with as much care as we seek light, adhering in this to ancient traditions.

In the thirteenth century they began to enlarge their windows, at least in the *salon*. This tendency increased as active life, industry and commerce gained more importance among the city people, who needed the daylight for their avocations. The house was no longer

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the closed refuge of the family, it was also the work-room, and from the beginning of the fourteenth century the houses in manufacturing towns opened on the street. Notwithstanding the liberal fenestration in the fronts of that period, it is wonderful how certain industries could be carried on in narrow streets crowded with overhanging stories; it is inexplicable until we see, for example, the silk weavers of Lyons working on the most delicate tissues in rooms where one can hardly see to read. The sight accustoms itself to obscurity, and the excessive natural, or fictitious, light that we require everywhere to-day is not a necessary condition for works of great fineness.

However that may be, from those mediæval workshops, which seem so dark to us to-day, came work of the goldsmith and embroideries and fabrics whose delicacy we do not easily attain with all our modern illumination. It is all so much a matter of habit that an artisan accustomed to work from his infancy in a doubtful light may be no mean workman. Because our fathers saw the "Cid" of Corneille by candle-light, we must not assume that they appreciated less vividly this chef-d'œuvre of the dramatist.

So much, then, for the criticism which charges the mediæval architects with having built small, dark, and uninhabitable houses. Dark and uninhabitable for us they may be, but their contemporaries found them commodious and sufficiently lighted.

This is, however, aside from the question of art; that the architectural quality of a house does not depend upon the greater or less breadth of the street on which it is built, is already proved.

(To be continued.)

COMMUNICATIONS

LEAD PLATES IN MASONRY.

Washington, D. C., Sept. 23, 1888.

To the Editors of the American Architect: —

Dear Sirs, — In your number of Sept. 8th, I read an article headed "Effect of Lead Plates in Masonry," in which reference is made to actual tests of compressive strength of stone in 1855. It speaks of a test on marble (1½-inch cubes), which showed a compressive strength of 60,000 lbs. per square inch without the interposition of lead plates between the steel plates of the testing apparatus, and a compressive strength of only 30,000 lbs. with the interposition of lead plates. The cause in explanation of this difference of 50 per centum of resistance seems to be somewhat obscure in the above mentioned article. The stone cube under pressure will in either case and all cases give away at the weakest place first, which is at the sides, the central portions being held firm by the outer portions until the latter give way. In case of interposed lead plates or any other more or less elastic bodies the question at once becomes a combined one of compressive strength and tensile strength. The lead plates under compression yield to a more or less degree; this yielding must result in a flow of the metal toward the sides, where the lead plates will then visibly protrude. This side motion of the molecules of lead under the enormous pressure incident creates also an enormous friction on the surfaces of the stone cube and the steel plate. It is the friction on the stone cube which acts from the centre of surface in opposite directions (radial) and tends to tear the stone cube asunder. The tensile strength of stone being generally much less than 25 per centum of the compressive strength, it seems evident that the stone cube must break or crush as it may appear, when lead plates are interposed, under a much smaller pressure than that necessary to crush it without the interposition of lead plates.

H. Von Bayer, *C. E.*

NOTES & CLIPPINGS

A Buried Dalmatian City. — An Austrian Pompeii has just been unearthed near Zara. Zara is the capital of the Austrian province of Dalmatia. Thousands of coins of the Diocletian period and of other early times, rare specimens of Grecian and Roman sculpture and Byzantine architecture were discovered along the Dalmatian shore. Amphitheatres, temples, catacombs and other evidences of a busy and highly civilized community were unearthed. — *Associated Press Report.*

A Curious Penalty for a Strike. — The will of M. Bord, the well-known piano-maker of Paris, has given rise to some remarkable proceedings on the part of the testator's heirs and of the workmen employed in the establishment, which had been organized by the deceased and conducted by him with great prosperity for many years. M. Bord died a few months since, and under his will he left large legacies to his employés of every grade, the smallest amount bequeathed being $200 to each of those who had only been five years in his factory. After the death of the testator his nephews found another will in which no mention was made of legacies to the employés, and this being dated 1884 invalidated the first document. M. Bord had, in fact, disinherited his workmen, because they had struck for more wages in 1883. The workmen have in the meantime gone to law with the executors, in order to contest the validity of the second will, and out of 500 of them 150 have been dismissed from their employment. — *New York Tribune.*

Red Tape at the Panama Canal. — The Panama Canal seems to be suffering from red tape. On one occasion it took sixteen days' time and 200 miles of travel for vouchers for some lubricating oil, which was lying alongside of the dredges for which it was intended; and these dredges lay idle at a cost of $3000 a day until they could get the oil. Upon another occasion it took seven days to get five cents' worth of vaseline out of the basement of the building in which it was needed on some instruments of precision to prevent rusting. — *Philadelphia Press.*

A Peculiarity of Glass Eyes. — "The Rubbi family of Venice have been famous glass-blowers for nearly four centuries," says the London *Hospital*. "Their specialty is the manufacture of glass-eyes, which they make in all varieties of quality. Common glass eyes, such as are made for hospitals, are easily made, and cost about 8 *s* each. But fashionable people are not satisfied with these, and some have half-a-dozen eyes manufactured for them before they are satisfied. Then they require at least two sets of eyes, one for evening wear, with larger pupils than the day ones, because the pupil of the eye is larger by night. Think of the horror of a lady whom some accident has forced to wear a glass eye, on finding, after she had entered a ball-room, that she had put in the wrong eye, and was going about with pupils of different sizes. The effect would be as bad as a squint, or even of chronic wink."

Peruvian Whistling Jugs. — The silvadors or musical jugs found among the burial places of Peru are most ingenious specimens of handiwork. A silvio in the William S. Vaux collection at Philadelphia consists of two vases, whose bodies are joined one to the other, with a hole or opening between them. The neck of one of these vases is closed, with the exception of a small opening in which a clay pipe is inserted leading to the body of the whistle. When a liquid is poured into the open necked vase the air is compressed into the other, and in escaping through the narrow opening is forced into the whistle, the vibrations producing sounds. Many of these sounds represent the notes of birds; one in the Clay collection of Philadelphia, Pa., imitates the notes of the robin or some other member of the thrush tribe peculiar to Peru. The closed neck of this double vase is modelled into a representation of a bird's head, which is thrush-like in character. Another water vase in the same collection, representing a llama, imitates the disgusting habit which this animal possesses of ejecting its saliva when enraged. The hissing sound which accompanies this action is admirably imitated. A black tube of earthenware ornamented with a grotesque head in low relief, to which short arms are attached pressing a three-tubed syrinx to its lips deserves special mention, as it suggests the evolution of this instrument from a single tube to more complicated forms. — *The Clay Worker.*

Permeability of Portland Cement Mortars. — A recent number of the *Annales des Ponts et Chaussées* contains an interesting article on the permeability of Portland cement mortars, by Messrs. L. Durande-Claye and P. Bebray. In conducting a series of experiments on samples of cement mortar taken from various marine works in England, France and Belgium, the authors observed that all these mortars were permeable. A block of the material placed in an earthenware dish in such a way as to divide the dish into two compartments was rapidly penetrated by a 6 per cent solution of magnesium sulphate poured into one of the compartments, leakage past the sides of the block being prevented by a water-tight joint of plaster. As the solution filtered through it was constantly removed by a siphon, and fresh solution poured in to the first compartment. At the end of sixteen days a fissure 3 or 4 centimetres long appeared in the block, and on the next day another crack was seen, the block swelling in the process. It was then determined to carry out a number of experiments with ordinary water, a solution of chloride of magnesium and one of sulphate of magnesium. The arrangement finally adopted was to close one end of a glass tube about 1 1-3 in. in diameter, with plugs of the cement mortar, the other ends of the tubes being closed with caoutchouc stoppers, through which passed glass tubes about 40 in. in length connected with Marriotte flasks containing the different solutions. The cement mortar used consisted, in each instance, of one part by weight of cement to four parts of sand, mixed with quantities of water varying in different cases from .07 up to .12 of the total weight of the mixture, and in all the experiments the rate of filtration was at first somewhat rapid, but diminished as time went on, becoming finally extremely slow. The glass tubes invariably cracked after some days owing to the swelling of the cement plug, thus putting an end to the experiments. Three series of experiments were made: in the first the mortar prepared with 9 per cent of water was the least permeable, that mixed with 7 per cent was extremely so, as was that prepared with 11 per cent. In the second series the best results were obtained with 11 per cent of water, and in the third series with 10 per cent. The action of the chloride of magnesium, which was a 6 per cent solution, was much less injurious than the solution of magnesium sulphate, which was of the same strength. Chemical analysis showed that the cements after being acted on by the latter reagent, contained from .75 to .80 per cent of sulphuric acid, showing that in the double decomposition taking place between the calcium and magnesium salts, a portion of the calcium sulphate remained in the body of the mortar, and it is to this fact that the authors are disposed to attribute the dislocation of Portland cement masonry when exposed to the action of sea-water, for whilst the magnesia produced is deposited in the state of a thin cream without consistence, the sulphate of chalk solidifies more or less completely in the crystaline form and develops considerable internal stresses.—*Engineering.*

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Frankfort-on-the-Main Railway Station.—On Saturday the 18th ult., the new central railway station at Frankfort-on-the-Main was opened to public traffic. It is claimed that Frankfort is now in possession of the largest railway station in Europe and possibly also in the world. The new buildings extend over a superficial area of 31,284 square metres, thereby exceeding the railway station at Munich (hitherto the largest), by 12,000 metres and St Pancras Railway Station in London by 15,500 square metres. A certain idea of the vast proportions of this structure is gained from the fact, mentioned by *Kuhlow's Review*, that the Frankfort Opera-House would not take up quite a third part of the vestibule, in which the Mayence Town-Hall could be conveniently placed, and that each of the three platform-halls could conveniently accommodate the Cathedral of Cologne without its spires. The new station lies full half a kilometre distant from the old Western Railway station. This circumstance, which necessitates on the part of the public the expenditure of additional time, trouble and money, might easily have been avoided, and is, therefore, to be regretted. The town of Frankfort is in consequence extended by about half a kilometre from east to west, and doubtless a new town quarter will soon arise to fill up the intermediate space.—*Invention.*

Fatal Accident from an ascending Lightning Stroke.—*Il Telegraphista* gives a highly remarkable account of a fatal accident during a thunder-storm. In the Isle of Farignana, at a height of one thousand feet above sea level there is a telegraph station, a telephone office and a semaphore signal post provided with a lightning conductor. These three lines all make earth in a well. About three o'clock sparks were seen to be passing from the telephone lines to the walls of the iron-building in which the instruments were placed. It appears to have been raining at the time, but no mention is made of any other signs of a thunder-storm. The telephone attendant sent for a lineman named Auran; on his arrival he noticed that the lightning conductor belonging to the semaphore post had been fused at a point where it touched the iron frame of the building. Auran carried in his hand a hammer, with a wooden handle, which was connected to the head by two metal strips. He then touched *the earth portion* of the fused conductor with the hammer and immediately fell dead. It appears that the moment the unfortunate man touched the wire with the head of his hammer, he was in metallic connection with it through the two metal strips, with the floor of the building through his damp boots. It is suggested that a considerable difference of potential existed between the building on the solid rock and that of the earth, with which they were only in communication by means of the earth-wire which had already been fused. When the lineman touched the earth end of this wire a discharge passed through his body from the building to the earth.—*The Electro-Mechanic.*

Some Deserted Cities of India.—Those who found it difficult to believe in the possibility of such a deserted city as that described by Mr. Rider Haggard in "*She*," may, if one may judge from a London *Times* letter, prepare themselves for greater wonders in the architectural line, even if he should confine himself to simple description of actualities when he takes Holly and his friend to Asia. Says the letter: One of the strangest things in India is the multitude of deserted capitals. There are three old Delhis, three successive capitals of the East, all close to each other, all south of the present city. One of the three is Tugluckabad, a marvellous city on a hill, roofless, and absolutely deserted, but solid and gigantic. The second is Ferozebad, including the fort of Indraput, with a handful of inhabitants. The third is the old Delhi of Kutub, who was born a Turkish slave and died Emperor of India. His name still survives in the Kutub Minar, the finest tower in the world, springing aloft like a living organism, and in the oldest mosque in India, the Kutub Mosque. There is Daulatabad, in the Nizam's dominions, with a fort atop of a conical hill of black granite, artificially scarped. The fort is 500 feet above the plain; the city lies below, with European fortifications and dry moats; but almost the whole of the city is a jungle, tall enough to hide a herd of elephants. There we ate the best grapes we found in India, ripened naturally in February, square-sided, black, delicious. Thither it was Tugluck, the builder of that southernmost Delhi that still bears his name, dragged the whole inhabitants of Delhi, 800 miles off. "Twice," says Hunter ("*The Indian Empire*," p. 283), "he allowed the miserable suppliants to return to Delhi; twice he compelled them, on pain of death, to quit it." It was Tugluck who called the city Daulatabad, instead of Deogiri. He was a scholar and a soldier, and a very early, if unscientific, bimetallist. "Having drained his treasury, he issued a forced currency, by which he tried to make the King's brass equal to other men's silver. Foreign merchants refused the King's brass tokens, trade came to a stand, and the King had to take payment of his taxes in his own depreciated coinage." There is Golconda, once the capital of the Deccan, rarely entered by the traveller now. It is surrounded by a wall about four miles in circumference. The fortress is girt by a wall of about one mile. The citadel has an innermost wall, and on the very highest plateau of rock rests the King's palace. It is a deserted city, except the small garrison, with solid masonry of hewn stone, still firm. A high wall of some fifty feet runs round the zenana, with one breach on the southeast side. Aurungzebe's soldiers made that breach September, 1687. Hyderabad is half visible, amid its trees, the Char Minar and Mecca Musjid conspicuous above all. One side is the Mir Alam Lake, on the other the Ausan Sagar, a dozen small artificial lakes; antelopes below you, nibbling grass where busy streets ran two centuries ago. Grand tombs lie amid orderly gardens outside the city, and granite hills bound the horizon.

Microbes on Walls.—M. Esmarch, in *Le Génie Civil*, gives the result of some experiments in the detection of microbes on the walls of living-rooms, etc., that are calculated to alarm the timid reader not booked in the new science of microbiology. He wiped a certain surface on the walls of a room with a small wet and sterilized sponge, and then with this sponge impregnated some so-called culture gelatine. As a result he claims to have found from 17 to 5,391 colonies of microbes per 25 square centimeters of wall-surface, according to the character of the wall, whether it was paper, oil-paint, or polished plaster, and also whether the room was a bedchamber, a room in a hospital, etc. The upper part of the wall is less rich in bacteria than the lower six feet, according to M. Esmarch. He then used a process which destroyed the bacilli and left the spores alive; or he exposed the gelatine of culture to a temperature of seventy degrees C. for five minutes. He found that in his experiments there was one spore to forty-four germs, and at times no spores at all. A jet of steam on the walls did not much diminish the number of the germs. A solution of phenic acid, of two to five per cent, did not at once give absolute disinfection; but repeating the operation after twenty-four hours gave perfect satisfaction. M. Esmarch obtained the surest results by rubbing the walls with the *crumbs of fresh bread*. One operation was sufficient, except in certain bad cases where three or four were necessary, to remove all the living germs. But he cautions the user to be careful not to allow the crumbs to lie on the ground; they should be destroyed by fire.—*Engineering News.*

TRADE SURVEYS

Inquiries made among the managers of the great manufacturing establishments, bring out the fact that there is a large amount of contract-work now coming in sight. The builders of hydraulic-mining machinery and heavy steam-using machinery of all kinds, as well as electric-light machinery-makers, are having more work coming in upon them this September than they have at any time in their history. This is not exceptional. The smaller establishments employing from 100 to 200 or 300 hands are about as well fixed. There are establishments in the New England States, and in New York, Pennsylvania and Ohio, which have from two to six months' work ahead guaranteed to-day. There are enterprises likely to be undertaken next year involving the outlay of millions of money which will make an enormous amount of work for those large establishments, which will create a heavy demand for iron and for all the material they consume. The enlargement of capacity in a number of these works is, therefore, contemplated, but there will not be anything done until every element of uncertainty is removed. Several large mechanical establishments are also projected in the South. There are a number of establishments to be built for the manufacturer of railway material and appliances. The States of Georgia and Alabama will be favored; Tennessee comes third. Northern capital will also embark very largely in iron-making in one or two of these States. The makers of saw-mill machinery have a great deal of work promised for this winter. Those who have been investigating this industry say that there will be something like a boom in saw-mill and planing-mill building set in. The room for this enterprise has been made by the construction of railroads in the South which have opened up valuable timber-territory. There is an improving demand for all kinds of Southern hardwoods, as well as yellow-pine and North Carolina pine. Some mill-men are quick to recognize an opportunity when it presents itself, besides they are seeking an eligible situation where fuel and labor are cheapest. The means for transportation are abundant. The best authorities on lumber state that a heavy increase will take place next year in the shipment of all kinds of Southern products to Northern markets, including iron and steel. An arrangement is now being made by which the cost of carrying crude-iron from the interior to Alabama to Georgia ports, and from thence by water to Northern ports will be considerably reduced. This will, of course, jeopardize in a measure the crude iron interests of Pennsylvania. At this time Pennsylvania iron-making is barely paying, and any fresh competition will necessarily interfere with the profitable operation of a good many of the older style of furnaces. Pennsylvania furnace-managers have been endeavoring to guard against this long expected danger by making improvements, but high-priced fuel and stiff railroad freights are not to be gotten over, and the Southern managers will not be slow to seize the advantage offered.

The year 1889 will be a shop-building year as well as a year of building small houses in all the region of country where the new industries are penetrating and planting themselves. Several syndicates have been organized within the past few months to conduct industrial operations and manufacturing enterprises in the newer sections of the country on an enormous scale. As evidence of this, reference may be made to a company controlling millions of capital, which is to be invested in the construction of short-line railroads and manufacturing establishments of every possible character. This individual scheme may be or may not be seriously contemplated, but there are a number of syndicates controlling capital running up into the millions which will be employed in all kinds of operations in the West and South upon a large scale. As has been frequently noted, the construction of short lines of railroads will engage the attention of railroad managers next year for the purpose of holding out for an enhanced value on the land through which they pass. The competitor of the Standard Oil Company has already taken shape, with a claimed capital of $30,000,000. Even if its claims are not what they appear to be, they truthfully indicate a tendency in our commercial and manufacturing circles that is to form powerful combinations or syndicates for operating on a large scale. The pioneers have already shown what can be done and organized capital will now march in solid battalions to take possession of the extraordinary opportunities which are presented West of the Ohio River and South of the Mississippi. Trade conditions continue sound. There is no increase in commercial failures. A higher order of financial dealing is now in control of most of the industries and commercial houses. The commercial agencies are better managed than ever and are rendering very valuable service to trade and patrons. Reports now possess more value than they have had when the necessity for exactness was not so generally recognized. A rapid expansion of trade has obliged the leading agencies to employ more reliable agents to collect sound information. The business men now think they can rely much more safely upon the reports than ten years ago. The mining interests are in profitable operation. The artificial fuel does not interfere apparently with the use of coal. Since the first of July a number of coal-mining operations have been formed for operating in the regions west of the Mississippi; namely, in the Northwest and Southwest. Orders for machinery, coal-cars and all the necessary appliances have been placed within the past month or two. A very rapid developing of the coal-producing capacity in these sections may be relied upon. Coal is in urgent need, as freight rates from the older sources of supply interfere with manufacturing requirements.

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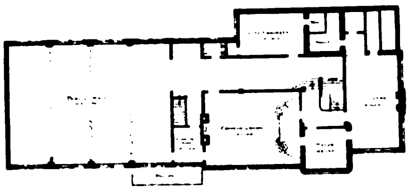
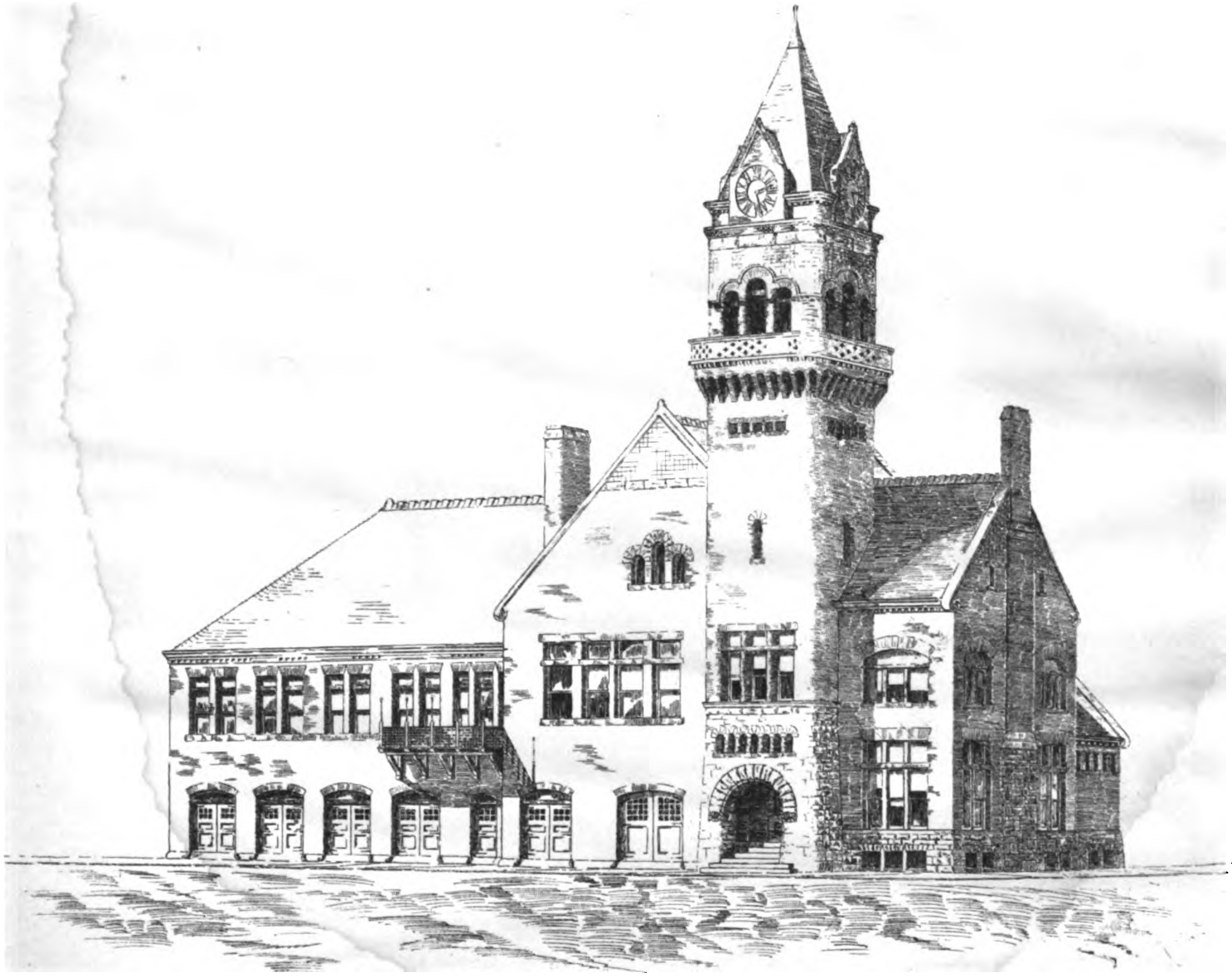
City Hall
Kearney Nebr
Geo. W. Frank, Jr.
Architect

First Floor Plan



Second Floor Plan



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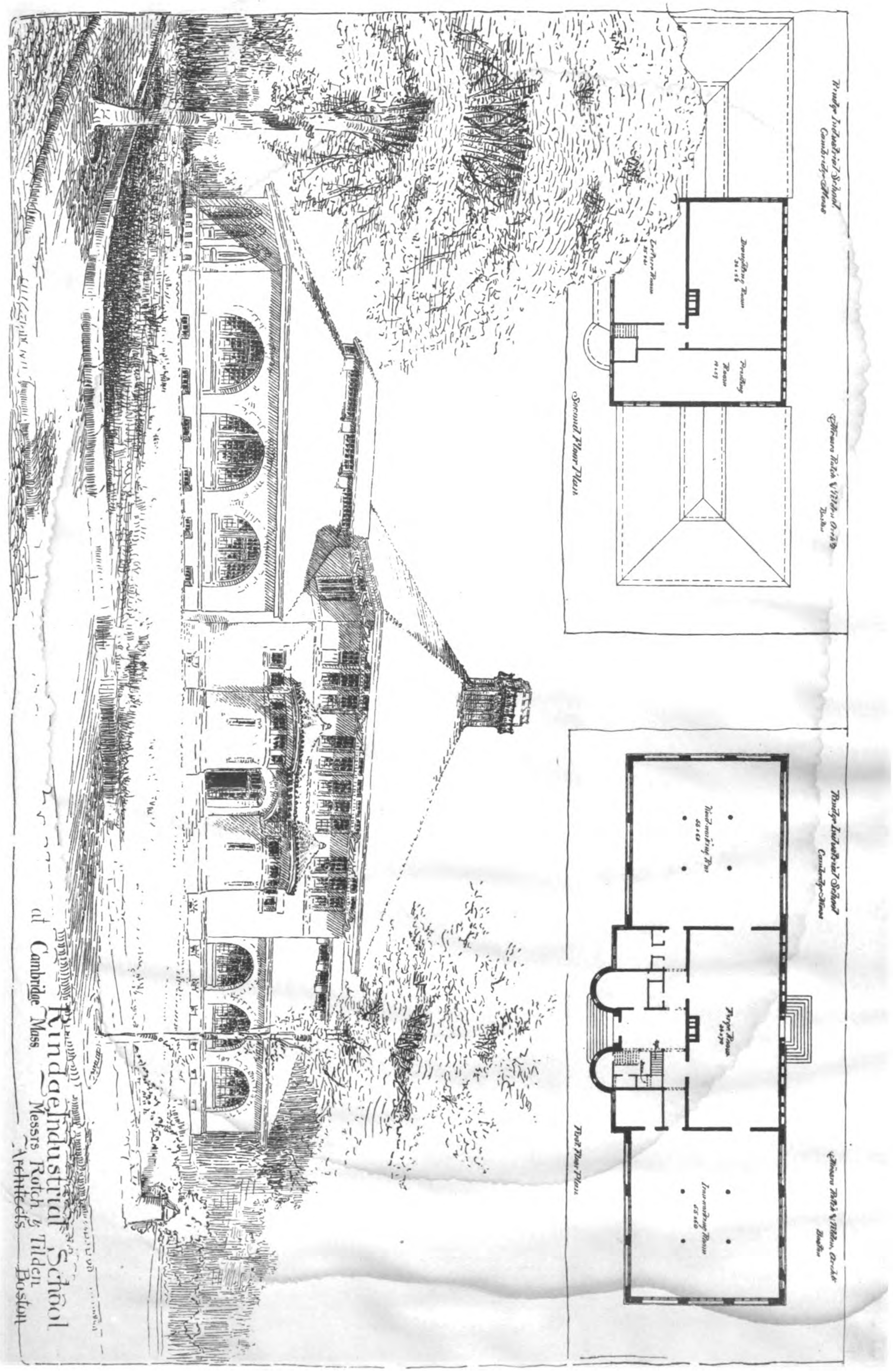

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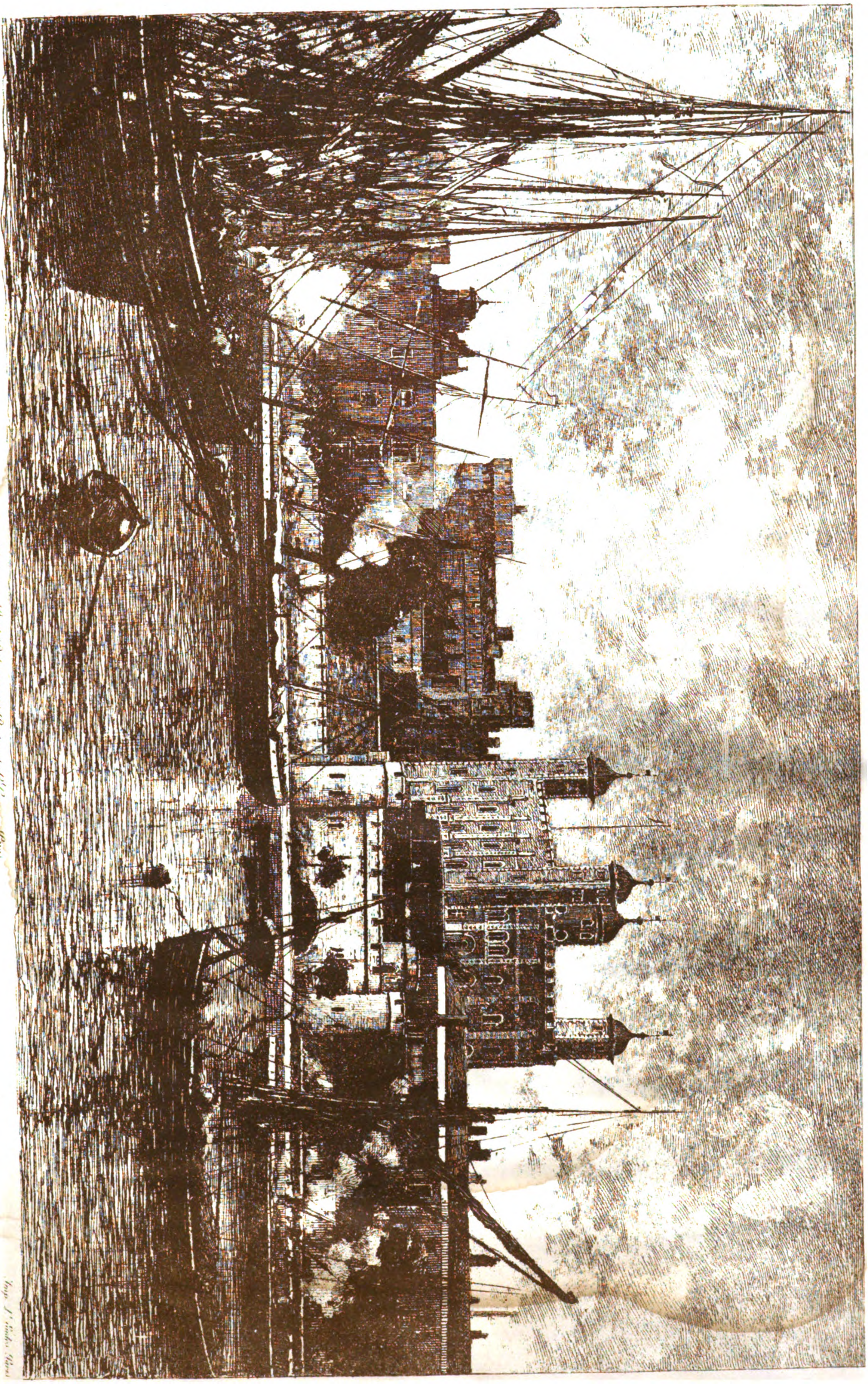

Tower of London

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No. 666 American Architect and Building News, Sept. 29 1888

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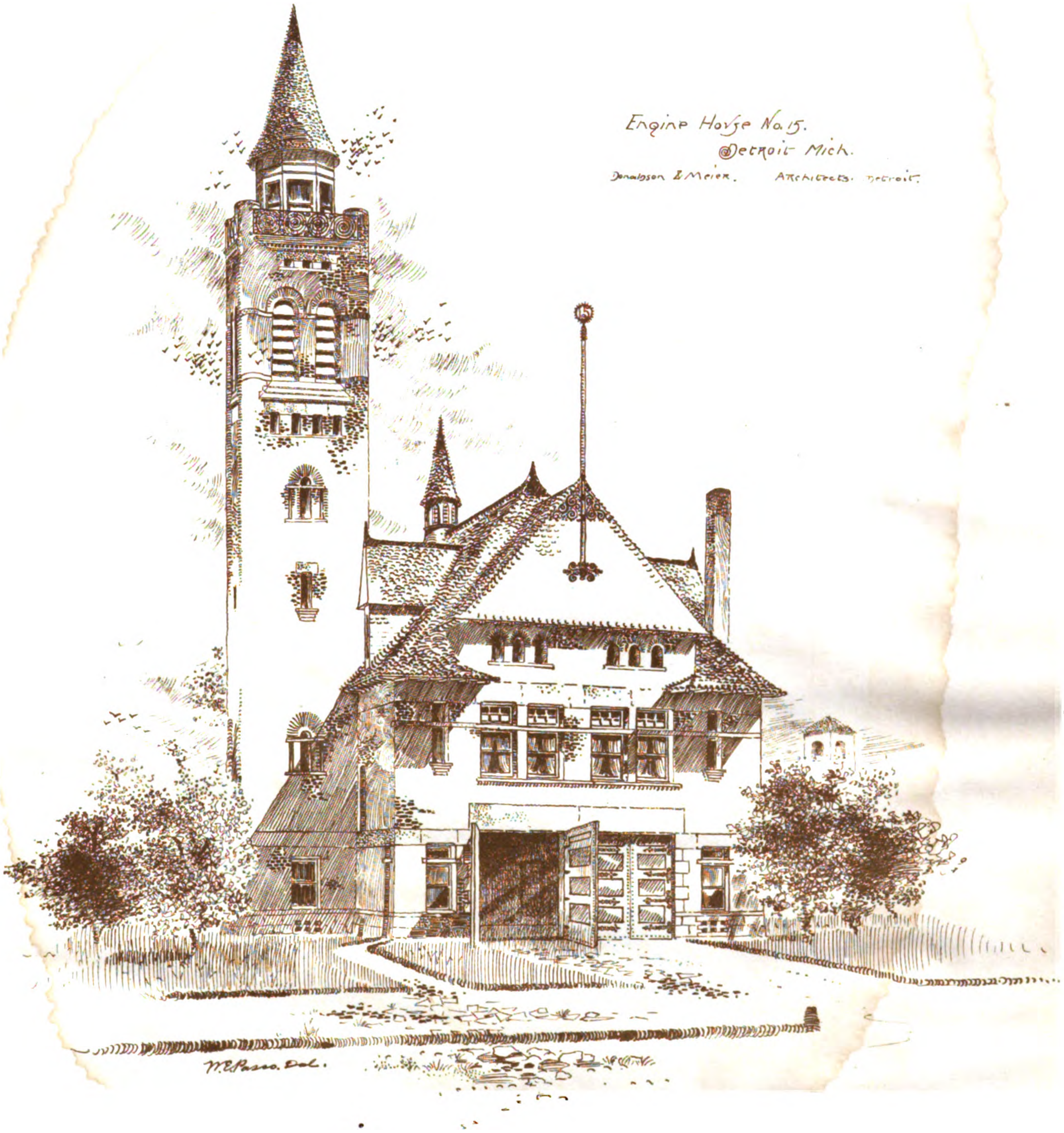

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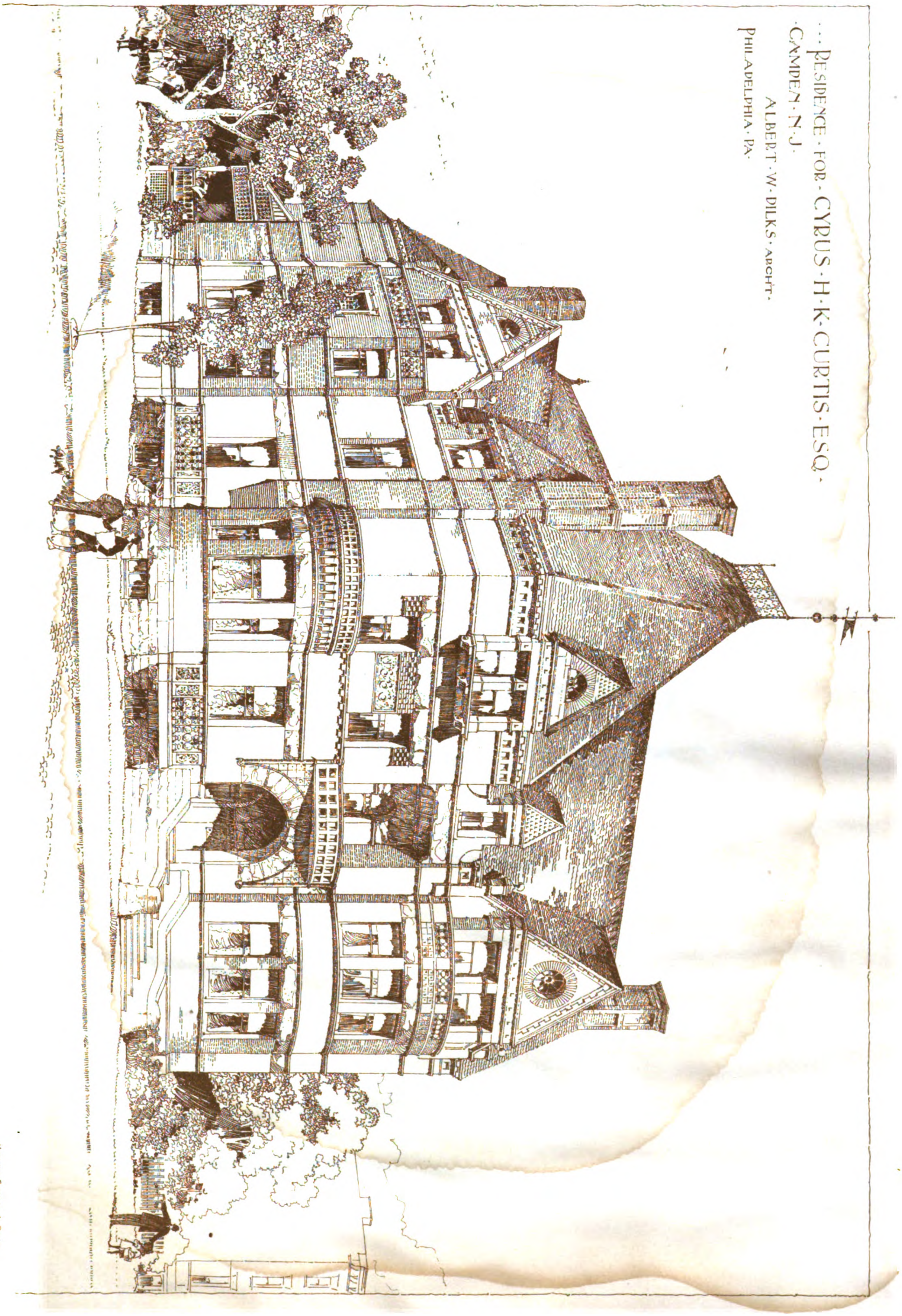

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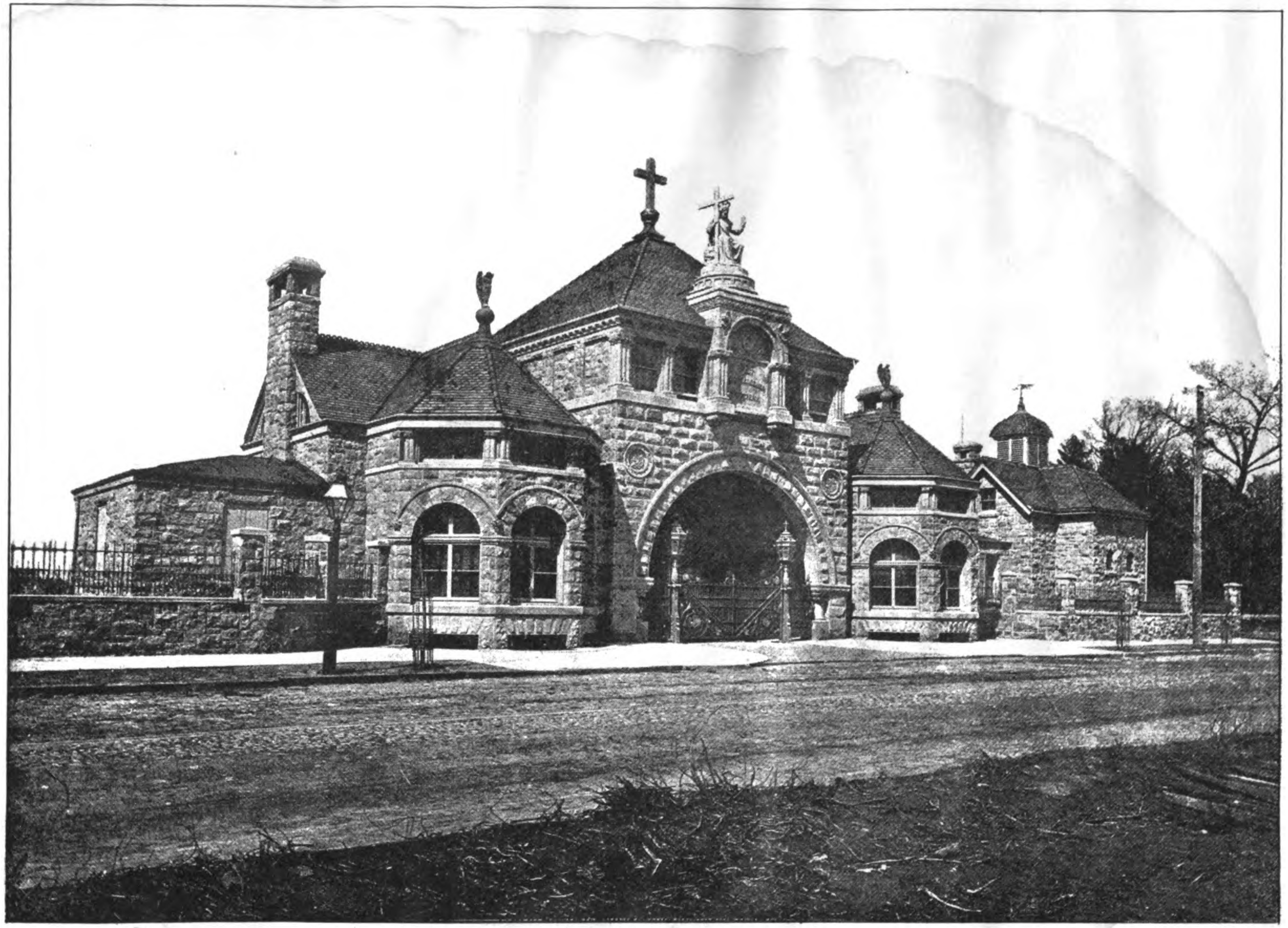

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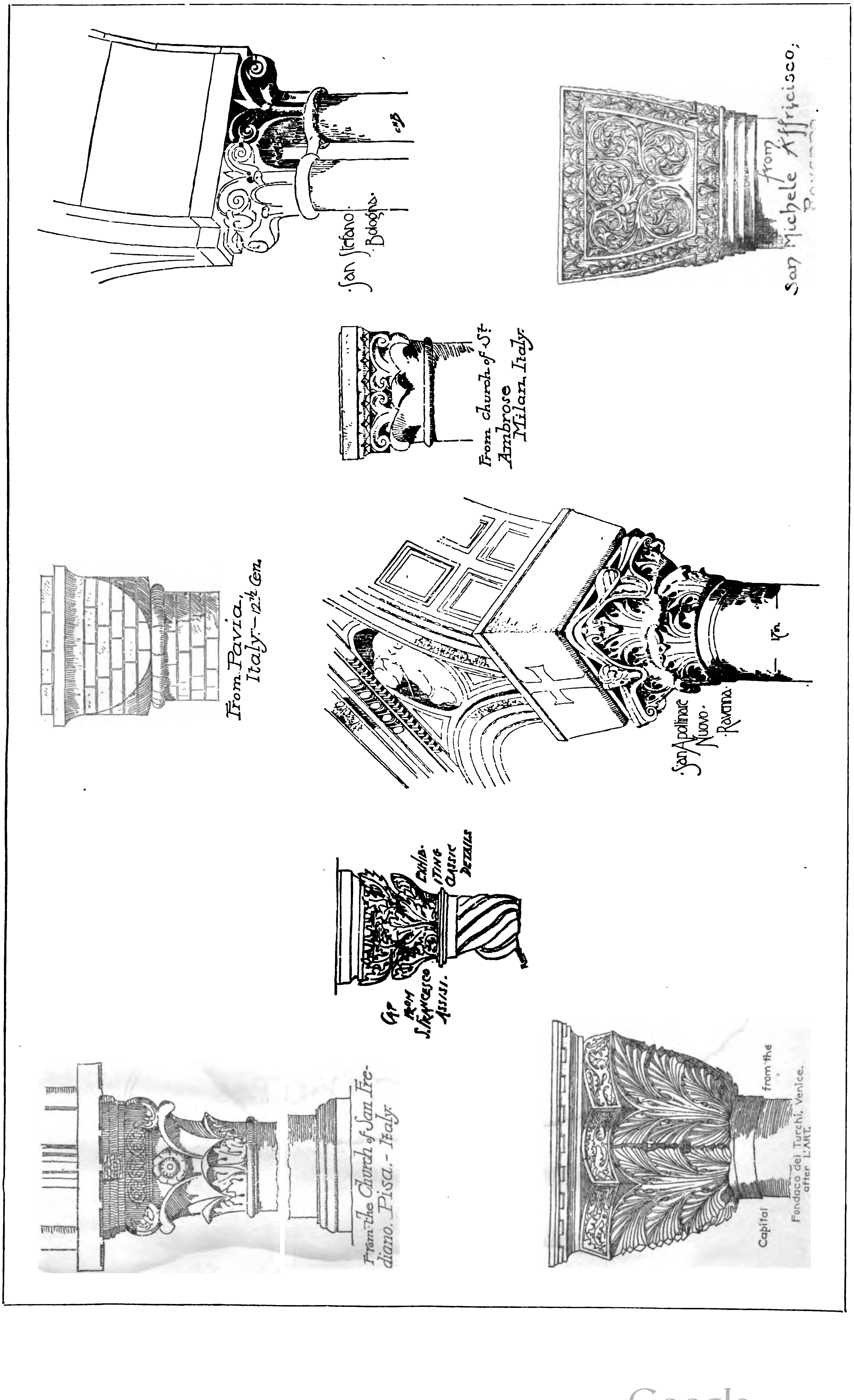

ITALIAN CAPITALS.

THE AMERICAN ARCHITECT AND BUILDING NEWS

VOL. XXIV. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 667.

OCTOBER 6, 1888.

Entered at the Post-Office at Boston as second-class matter.

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CONTRACTORS will be interested in a difficulty which the builder of the new Hall of Records in Jersey City has got into. The new building adjoins the Court-house, and since the commencement of the September term, the judges and other court officers have been much annoyed by the noise proceeding from the operations next door. A few days ago, after it had become necessary to suspend the trial of cases on account of the racket, the judge summoned the contractor and his men before him, and told them that the noise must be stopped while the court was in session. The men were then allowed to depart, but as soon as they got back to their places they began to work with as little regard for judicial nerves as ever. The judge sent for them again, and threatened them with punishment for contempt of court unless they obeyed his orders; and on the appearance of some signs of resistance on the part of the contractor, he had constables detailed by the sheriff to see that the objectionable operations were stopped. Naturally enough, the contractor regards this interference with his work on the part of the county officers as a violation of the contract, and proposes, if he is prevented from carrying it out in the usual way, to sue the county for damages. If his contract were with a private owner, we should say that he had a strong case, as one party to a contract certainly could not prevent the other from carrying out his argument without forfeiting the advantage of it, and becoming liable for damages to the other party; but the application of the law to the officers of the law is a somewhat delicate process, and it will be interesting to learn the result of the controversy.

A SINGULAR piece of work has just come to grief in Philadelphia. It seems that eleven years ago a certain real-estate owner decided to build eight houses on Chestnut Street. His lot had been filled in with gravel, brick-bats, ashes and other rubbish, and he wished to get a cheap foundation, which should be sufficient to prevent his houses from sinking into the soft ground. With the consent of the Inspector of Buildings he arranged to build the cellar walls on a footing of hemlock planks, the Inspector, according to the newspaper story, remarking that if the planks should rot, the mortar would have become so hard that it would keep the houses from going to pieces. There was no water in the ground, and the hemlock pieces were simply laid on the rubbish, to a depth of six inches or more, and the houses were then built on the planks, of brick, four stories high. Last July indications began to be observed that the hemlock had rotted, and that, contrary to the Inspector's anticipations, the mortar had failed to hold up the houses without the accustomed aid from below. Dislocations appeared in the cellar walls, the drain-pipes broke off, the door-frames became distorted, and the walls of the superstructure began to crack in all directions, until the front wall of one of the houses had become so cracked that, according to a reporter, it looked as if overrun with ivy. The property had passed into the hands of the Girard Trust Company, and repairs were at once commenced. It was found that the hemlock footings were reduced to a mass of crumbling fragments, and they are being replaced with stone, while the fronts will be entirely rebuilt.

M. DIEULAFOY, the explorer of Susa, has published a book on Persian antiquities, in which he presents some interesting suggestions on the origin of the mediæval system of architecture, and its relations with that which existed in Persia three or four hundred years before. M. Dieulafoy was once an assistant to the late Viollet-le-Duc in his labors in the restoration of mediæval monuments, and was very closely associated with him, so that his opinions upon the sources of the architecture of the Middle Ages are worthy of the highest respect. As we know, Viollet-le-Duc recognized the similarity, in many points of construction and decoration, between the French churches of the twelfth century and the Syrian buildings of the fourth century, and supposed that they were due mainly to the influence of the Oriental ideas and objects which were brought back to Europe by the returning Crusaders, although the way had been to a certain extent prepared for them by the Venetian traders, who maintained a constant traffic between the Atlantic and the Mediterranean coasts of France. M. Dieulafoy, however, finds the mediæval system of vaulting, by means of a skeleton of ribs, filled-in with panels of light stonework, so similar to Persian construction dating from the fourth and fifth, and even from the second century, that he is compelled to find some way of accounting for what cannot be a mere coincidence.

IT is a matter of history that, after the conquest by the Mussulmans of the region on both sides of the Straits of Gibraltar, and perhaps long before that time, the passage of the Straits was so unsafe for merchant vessels, on account of the pirates who infested the place, that the Venetians, prevented from reaching their richest customers, the English, by sea, established a caravan route from Aigues-Mortes, then one of the best harbors on the Mediterranean coast, northwesterly to La Rochelle, on the Atlantic, where they embarked with their goods and carried them to England. On the long route across France, some five hundred miles, they had regular halting-places, and one of these, Limoges, with the neighboring town of Perigueux, became the great distributing point for such of their wares as they might sell in France, and soon filled with Venetian merchants. The Venetians, who traded continually with Constantinople, brought spices, jewelry, embroideries and other Oriental goods with them, and Persian and Eastern bric-à-brac became tolerably common in the houses of the rich and the treasuries of churches. Naturally enough, the stone-carvers in that region, when they wanted an idea for a new ornamental design, would often take a hint from some Oriental work that they happened to see, and the route of the Venetian caravans is marked to this day with tolerable clearness by the palm-leaf patterns and the interlacing curves, adapted from Persian embroidery, and cut in stone on the old churches. There were other routes by which Persian wares entered France. One frequented road was certainly through Switzerland, probably over the Saint-Bernard pass and through the Rhone Valley, and the church of Saint Maurice, between Martigny and Geneva, still possesses a Persian water-pitcher of the seventh century, probably bought of a Venetian or Greek pedler twelve hundred years ago. The traffic between the East and the West, indicated by these remains, was very flourishing long before the first Crusade and it seems more than likely that some description of the Persian vaulted buildings may have reached the ears of the architects of that day. In fact, as they were quite familiar with Roman vaults, the fragments of which still covered the soil of Southern France, the account of vaults differing from the Roman principally in the use of ribs at the groins would be perfectly intelligible to them, and they would recognize as readily as we should the advantage of the skeleton of ribs and the light filling of the panels. In the year 717, on the accession of the iconoclast Emperor, Leo the Isaurian, a great many artists and artisans fled from Constantinople and took refuge in France and Germany. Many were hospitably received by Charlemagne, and these emigrants, familiar with the art and architecture of Asia Minor, which was to a great extent copied from that of Persia, must have done much

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to spread the knowledge of it in Europe. Under Charlemagne and his immediate successors the country was too disturbed for building, but M. Dieulafoy thinks that the artists, and particularly the architects, exiled from Byzantium must have found congenial companions and attentive listeners to their instructions among the monks. In some cases the monks probably took written notes of what their new friends told them for future use, without knowing when they might be of service. Nearly three hundred years later, in the midst of Burgundy, where, ten generations before, Charlemagne had settled his colonies of exiled Byzantines, an abbey church was built, which still stands unaltered, and presents so close a resemblance to two Syrian churches of the fourth century that M. Dieulafoy believes that the monk who designed it must have found in the convent library the notes and plans left by some exiled Byzantine architect during the reign of Charlemagne, and used them as the basis of his building. In the main part of the church not only is the system of vaulting completely Asiatic and not Roman, but the details of the columns and capitals are Oriental. Only in the porch, where the architect's courage seems to have failed him, is there any return to the Roman system of construction which had hitherto been regarded as the foundation of all art. A few years later similar experiments were made elsewhere, and the new system of concentrated forces, framework of ribs and light filling between them, which was unknown to the Romans, but had been familiar to the Persians and Asiatics for a thousand years, rapidly spread through France. If the way had not been prepared for it to some extent by the previous intercourse of the people with the Eastern traders, it may be doubted whether it would have made its way so rapidly, and even now it is not always easy to distinguish whether certain mediæval forms are derivations from Oriental patterns or are only accidentally similar.

A CORRESPONDENT makes, in *La Semaine des Constructeurs* an observation which is new to us, and has a very considerable importance for those who are obliged to build in soft soil. The common idea of architects is, as we know, that foundations in soft soil ought to be so arranged that the pressure shall be the same under each square foot of the ground covered by the footings. In Chicago, where the art of building on yielding ground is carried to great perfection, the footings of piers and walls are calculated with precision, so that the load on each portion shall be supported on an area of subsoil proportionate to the load. It seems, however, that buildings planned in this way do not always show the perfect uniformity of settlement expected of them; the smaller piers, although transmitting the same load as the larger ones to each square foot of earth under them, sinking considerably less, so that in a building, for example, with two side walls, and a row of columns through the middle, the side walls settle more than the foundations of the columns, leaving all the floors higher in the middle than at the sides. In 1864, some experiments were made in France to determine the cause of this phenomenon, and it was found that, besides the resistance of the soil directly compressed under the footings, a good deal of sustaining power was derived from the friction of the surrounding soil. Of course, the amount of friction is proportionate to the perimeter of the footings, and this is greater, as compared with their area, in small piers than in large masses of masonry. Thus a footing-stone five feet square, under a given pier, will have only half the area of a foundation five feet by ten, under a pier of twice the size, loaded with double the weight; but the perimeter of the first footing is two-thirds as large as that of the second, leaving a surplus of frictional resistance in favor of the first, which may hold it up, while the neighboring pier, loaded with twice the weight, and sustained by twice the area of subsoil, is sinking. Just what is the ratio of the sustaining force exerted by friction to that due to the direct reaction of the soil, we are not informed, but in important structures it would be of interest to know; and we hope that some one may pursue the investigation further. The whole subject of friction in soils, as affecting their resistance to a vertical pressure, is a very important one. We all know that a footing of a given area exerts a greater sustaining power, the deeper it is set below the surface, although the compressibility of the soil may be the same at all depths. The reason of this is that a structure is more apt to settle by the lateral escape of earth from beneath its foundations than from the direct compression of the soil, and anything that prevents this lateral escape of earth assists its resistance. In very loose or sandy ground, the lateral escape is prevented by sheet-piling, but in most cases the only check to such a movement is the friction due to the weight of the column of earth pressing upon that just bordering the footings, and tending to keep it in place; and the deeper the footings are set, the heavier will be this column, the greater the resistance to any lateral escape and, consequently, the greater the stability of the foundation.

THE *British Architect* quotes from the *Estate Clerk-of-Works* a discussion on the relative advantages of different sorts of roof-covering for farm-buildings. Most of the participants in the discussion approve of good tiles, as being handsome and durable, and giving, when well laid, a very perfect roof. One person, however, prefers slate to tile, for the reason that tiles retain moisture, and rot the woodwork under them, while the timbers under slate roofs are almost always found dry and perfect. Another speaks of oak shingles as forming a good roof material, which when well nailed with zinc or copper nails will last for centuries; while a third recommends roofs thatched with reeds, which remain good for fifty years or more, and form a covering which is warm in winter and cool in summer, and is thus well adapted for stables and cattle-sheds. Another roof which is mentioned is, we imagine, new in this country, and consists simply of tarred felt, whitewashed outside. The whitewash is made with lime and skim-milk, and is renewed every spring. During the summer it reflects the sunlight, keeping the rooms under it cool, and in winter it helps to preserve the felt from the weather, besides, no doubt, checking in some degree the radiation of the interior warmth. So far as we know, shingle roofs are the only sort which are ever whitewashed here. These are occasionally treated with lime-wash and alum to preserve them, but the effect of the whitewash in repelling the heat of the sun is little thought of, although in our hot summers the practice of painting roofs white, as is done in China, and in Southern France, would certainly be advantageous.

WE hope that the next step in profit-sharing enterprises in this country will be taken in connection with the building trades. In France, the coöperative building-societies have quickly grown to a position of great responsibility, and the United States, with its enormous demand for small dwelling-houses, offers a particularly favorable field for similar associations. For work of the cheaper sort, two carpenters, a mason, a painter and a general helper could associate themselves and carry out houses complete, contracting only for materials, and arranging their work so that each might be constantly employed. It is true that the mason, in a small company, would have to be a bricklayer and plasterer also, but this combination of attributes, although it is looked upon with horror by the trades' unions, is often found among country workmen, and it is among men trained in the multifarious duties of country practice that such companies must be recruited. Once organized, it seems to us that an unlimited business would await them. The advantage to owners of finding the necessary men always at command to carry their buildings along to completion without interruption, instead of subjecting them to the interminable delays, carelessness and indifference of sub-contractors, would be so enormous that the work of a band of coöperating mechanics might well command a premium, while the economy of time and labor secured by men acting together, understanding each other's ways and wishes, and knowing exactly when their work will be ready for them, must be very considerable. We imagine that most architects would say that one-third, at least, of the time for which workmen in the building trades are paid is consumed in waiting for some one else to do something. From the time the cellar is dug until the house is occupied there are always persons in or about it waiting for "the boss to come," or "some one to set them at work," or "the stock to get there," or the "tools to arrive," or "the carpenter to cut a hole in the floor," or "the mason to furnish a chip to level up with," or a thousand other things, while the whole affair will often be at a standstill for weeks together, waiting for some irresponsible sub-contractor to fulfil his promises. A carefully-organized though small association would save the whole of the time spent in these useless delays, and would put in the pockets of its members the money represented by that time. It would be regarded with very little favor by the leaders of the Unions, who desire anything rather than to see men independent and self-reliant, but, if successful, it would open a prospect of employment and comfort to thousands who now look for either in vain.

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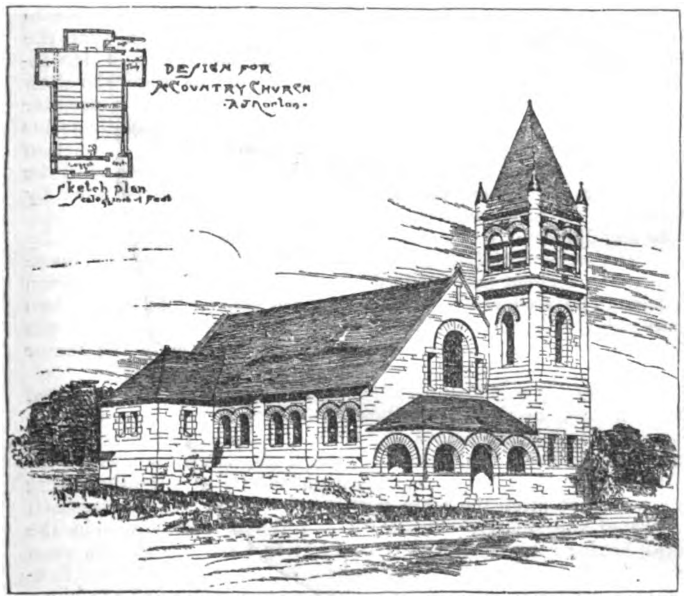
ARCHITECTURAL EDUCATION IN THE UNITED STATES.[1] — III.

CORNELL UNIVERSITY.

CORNELL University is one of the State Universities founded under the Act of Congress which endowed the several States with thirty thousand acres of land for each senator and representative, and enabled a few struggling colleges to rise at once to the rank of universities. The University of Illinois, the Institute of Technology, Boston, and Cornell University were all founded under essentially the same conditions. Cornell was incorporated in 1865, and opened in 1868. The architectural department was created in 1871 through the efforts of President White, who collected the greater portion of the library, and was personally much interested in the subject of architecture. The department was placed in charge of Professor Charles Babcock, who had received his earlier architectural training in the office of Mr. Richard Upjohn, of New York, and also had had considerable experience in teaching, aside from pure architecture. Professor Babcock had begun his studies with Mr. Upjohn in 1847, and was for five years a partner with his master. After having virtually abandoned the profession for a number of years, he was drawn to it again through the opening of an architectural course in Cornell University. The department started with seventeen pupils. At first, Professor Babcock was obliged to do all the work himself, as the school was but scantily endowed with money and equipments, but in 1880 some outside aid came to hand and the College of Architecture was placed on a more secure footing, more liberally endowed with books, photographs, etc., and Mr. C. Francis Osborne was appointed Assistant Professor. The department has also at present two assistants to aid Professors Babcock and Osborne in the purely architectural studies of the course. The greater share of the work having to do more especially with applied construction and designing is under the immediate direction of Professor Osborne, who has developed many of the methods in use for awakening interest on the part of the student and inciting to continuance in studies; while the theory of architecture, æsthetics, etc., as well as the general management of the whole is supervised by Professor Babcock.

Students in architecture are required to follow a course extending through four years. For the benefit of those who were unable to take, or did not feel the need of, so extended a course of study, there



A Student's Design.

was formerly a special course, but at the close of the past school year, it was decided to admit no more special students in architecture, and the course has, therefore, been discontinued. This change was made from a conviction that the advantages of a school-training for architects have become generally appreciated, and that the time is quite ripe for the University to take the position that its graduates must be thoroughly equipped, so far as preliminary training is concerned, to rise to the highest positions in the profession.

The regular course in architecture, leading to the degree of Bachelor of Science, is as follows:[2]

FRESHMAN YEAR.

FALL TERM.		WINTER TERM.	
French or German	5[3]	French or German	5
Algebra	5	Trigonometry	5
Rhetoric	2	Rhetoric	2
Free-hand Drawing	3	Free-hand Drawing	3
Drill	2	Linear Drawing and Projection	2
Hygiene, six Lectures		Physical Training	2

SPRING TERM.

French or Grammar	5
Analytical Geometry	5
Botany	3
Free-hand Drawing	3
Drill	2

SOPHOMORE YEAR.

FALL TERM.		WINTER TERM.	
Calculus	5	Building Materials and Construction	6
Descriptive Geometry	3	Electricity and Magnetism	3
Mechanics and Heat	3	Chemistry	3
Chemistry	3	Descriptive Geometry	3
Drawing	1	Physical Training	2
Drill	2		

SPRING TERM.

Construction	6
Acoustics and Optics	3
Blowpipe Analysis and Determinative Mineralogy	2
Shades, Shadows, and Perspective	3
Descriptive Geometry	3
Drill	2
Geology	3

JUNIOR YEAR.

FALL TERM.		WINTER TERM.	
Mechanics, Strength of Materials	5	Mechanics, Trusses	5
Egyptian, Greek, and Roman Architecture	3	Byzantine and Romanesque Architecture	5
Designing	6	Designing	7
Water-color Drawing	3		

SPRING TERM.

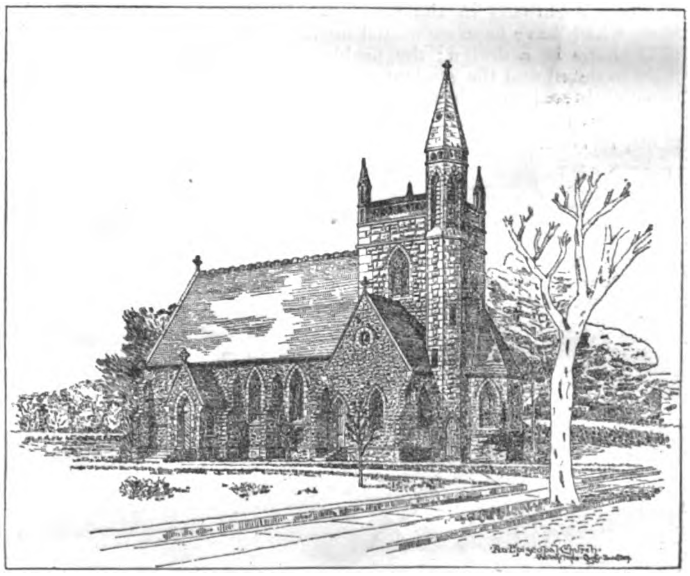
Mechanics, Arches	3
Decoration	2
Gothic Architecture	5
Designing	6
Photography	2

SENIOR YEAR.

FALL TERM.		WINTER TERM.	
Renaissance Architecture	3	Modern Architecture	3
Stereotomy	3	Stereotomy applied to Stone-cutting	5
Designing	9	Designing	7
Decoration	3	Military Science	2

SPRING TERM.

Acoustics, Ventilation, Warming, Measuring, Contracts and Specifications, Professional Practice, etc.	5
Designing	5
Modelling	2
Thesis	4



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It will be seen by this statement that in the first year there is only a very slight admixture of anything pertaining directly to architecture in the course. Practically, there is nothing except linear drawing and projection, which occupy six hours a week during the winter term. In the second year drawing is taught with considerable thoroughness, and during the third and fourth years it is combined with designing; so altogether the student gets considerable experience in drawing, besides which there is always abundant opportunity for any one who is willing to work to get a great deal more practice in architectural training. The drawing-rooms are open nearly all the time, and the students are encouraged to spend there all the time they can.

[1] Continued from No. 662, page 97.

[2] Since writing the above Professor Babcock has made some slight changes in the curriculum, which do not, however, materially alter the general conditions of the course.

[3] The number after each study indicates the hours per week devoted thereto each lecture counting 1, and 3 hours of drawing, designing, etc., counting 1.

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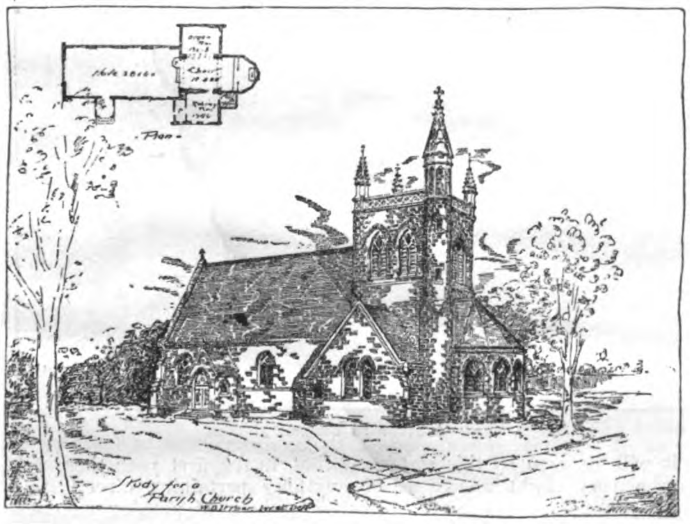
Analyzing the college course with reference to the time given to each study, it will be seen that under the head of pure mathematics, algebra, trigonometry, analytical geometry and calculus together occupy 220 hours. Applied mathematics, such as descriptive geometry, mechanics, etc., occupy 242 hours. The theoretical study of construction occupies 132 hours. Languages, limited to either French or German, 165 hours. The theory of architecture, including history, acoustics, ventilation, etc., 396 hours. Drawing is nominally allowed 2309 hours, and the general college studies, such as hygiene, rhetoric, drill, geology, chemistry, etc., together take up 479 hours, making the total number of hours for the whole course, 3943. It will be seen by this summary that 58.5 per cent of the time is given to drawing, and 770 hours or 19 per cent to studies which are purely architectural in their character, so that altogether 77.5 per cent of the students' time is occupied entirely with architecture, while 22.5 per cent of the entire course is given to studies which do not bear directly upon the profession in one way or another.

There is no instruction in shop-practice. The College does not consider it essential, as it is not thought that an architect will ever be called upon to use it in actual practice, and in any case the time of the students would be too limited to undertake any such study, except by taking time from subjects which are considered much more important.

Construction is taught chiefly by lectures illustrated by a very complete set of models, together with a liberal reference to various text-books.

A great deal of thought has necessarily been devoted to methods of teaching drawing. Most of the students come to the University quite unprepared; indeed, the majority of them are not in any way qualified to begin an architectural course, having had no previous training of any kind in drawing. In the first year nothing is attempted but a little line work and free-hand sketching. In the second term of the second year some general lectures on building-construction are given, to prepare the way for an understanding of what the student will have to draw, rather than to exhaust the subject. In the third term of the same year, the student is taught the rudiments of working-drawings, and is shown how to construct a simple house. A larger house is then worked out by the student, the construction being drawn in detail, and the working-drawings being elaborated to a certain degree. No part of this year's work involves design; the drawings being nearly all copied from models provided by the department, and the attention of the students is confined entirely to construction and to the preparation of working-drawings, specifications and contracts, with a view to the establishment of a thoroughly practical basis for the subsequent work, as also to enable the students to enter during their next summer vacation into practical office-work, which is regarded as a necessary supplement to the course.

During the first term of the Junior year considerable attention is given to analysis of the general principles of house-planning, porches, entrances, halls, etc., with illustrations drawn from actual work of the best architects in the country. About once every week, the ideas which have been suggested during that time are put into practical shape in a design; the problem being laid down pretty carefully in detail and the students required to bring in sketch-plans at one-eighth scale, which are criticised before the class. During the latter part of this term also, there are weekly exercises in sketching plans, forty minutes being allowed for the exercise, to develop the



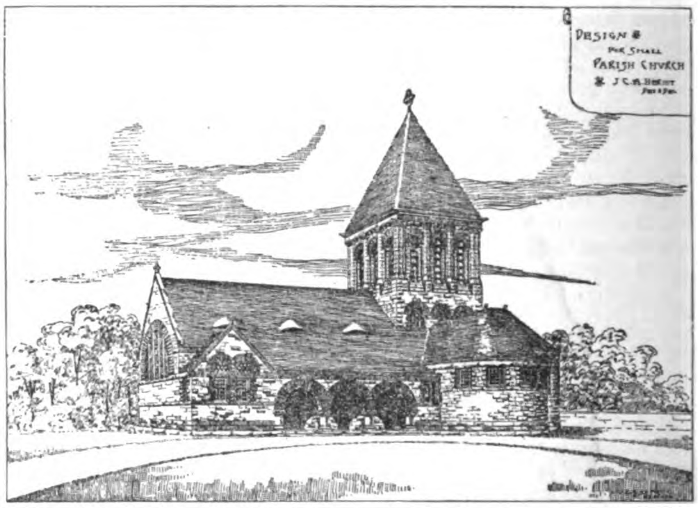
A Student's Design.

student's capacity of getting his ideas into shape in the least possible time.

During the second term of the Junior year, there are lectures on the general theory of design as applied to portions of exteriors, such as arches, walls, courses, roofs, etc. These lectures are given once a week, and special problems are selected to illustrate the individual features. The practice is to gather a number of illustrations from various architectural publications, together with all available photographs, to illustrate the given feature under consideration, and to bring these up in the class, criticising them, pointing out why they are successful or how they fail, teaching the pupil the *raison d'etre* of the various solutions. During this term there is also instruction given in perspective sketching.

During the third term of this year the students are required to work out a complete problem in design, including all plans, elevations and sections of some large building of a public character. These are not put into the shape of working-drawings, but are prepared as eighth-scale studies, together with two finished perspectives of the interior and studies of the interior design.

During the Senior year the work in designing and drawing is planned to give the student a practical acquaintance with the historical styles. The first term is occupied with the study of the round-arched Romanesque, together with sketches for important buildings in that style and the preparation of essays, illustrated by sketches, showing the development of some one feature in its relation to the growth of the style in general, each student being assigned a different feature. In the next term the pointed Romanesque, or



A Student's Design.

Gothic is similarly taken up, while the spring term is given to the study of Renaissance.

Perspective designing is practised once a week, beginning with small subjects, with limited conditions and in a specific style, in order to give the students exercise in sketching and to strengthen them in a knowledge of historic styles. During all the course the students are constantly urged to read and to use photographs freely in connection with their work, and, so far as possible, attempts are made to recognize individual talent, distinctions being made in that the classes each year are grouped according to the ability of the individual, and more extensive problems are given to those who show greater ability. In this way a student who manifests a peculiar talent for architecture is enabled to advance just as rapidly as his own ability will permit. Practically, however, this distinction between the students in regard to their ability is not made until the Senior year, as the most of the time up to that year is occupied by drawing as distinct from designing.

As an adjunct to the Department of Architecture of the University is the Department of Industrial Drawing, in which those who choose can obtain excellent practice in drawing from the flat copy and from models. The students in architecture are required to devote two hours a day to free-hand drawing during the first three terms of the Freshman year, and two hours a day during one term of the Junior year.

The history of architecture is taught entirely by lectures prepared and delivered by Professor Babcock. These are illustrated by photographs, slides, drawings and models. The department has an excellent equipment of photographic apparatus, and is supplied with a large stereopticon. The lecture-room is fitted with tightly closing blinds, so that after the main portion of the day's theme has been elaborated, the shutters are drawn, and the best buildings in the world, having connection with the subject in hand, are thrown upon the screen and explained to the pupils. Besides this, Professor Babcock has a number of printed notes on the history of architecture, which the students obtain and use in following the lectures, and the library is made very available and is always open to the students, so that those who choose may extend their reading, under direction.

There seem to be no definite requirements in regard to vacation-work. The students are encouraged, whenever possible, to spend the vacation in some architect's office and to supplement their theoretical training by a degree of practical experience, which cannot be given them in the University, and we believe that many of the students spend the greater portion of their vacation in this kind of occupation.

In addition to the models, etc., previously referred to, the architectural department has a fine library which was presented by President White, embracing over a thousand volumes pertaining to architecture and kindred branches. The architectural collection

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also contains over two thousand photographic prints, most of which are of large size, several hundred drawings, and some two hundred models in stone and wood designed to illustrate the construction, forms and peculiarities of the different styles of architecture. These are all freely accessible to the students of architecture.

The rooms are not very large, but are quite sufficient for the use of the department.

The requirements for admission to the College of Architecture include the ordinary English branches, algebra, plane and solid geometry, physics, trigonometry, and a knowledge of the rudiments of French and German. The student must be over sixteen years of age. There are no restrictions as to sex, and we believe there have been three ladies who have pursued the course of architecture at the College, and have graduated with honors. For the special students, the age must be at least twenty-one, and the admission is without examination, by vote of the faculty, on recommendation of the professor in charge of the department. Such students cannot be candidates for a degree, and their admission must be renewed every year. Special students of architecture must have served at least one year as draughtsman in an architect's office, and must be proficient in plane and solid geometry and in algebra, so as to be able to solve cubic equations. They are admitted only at the beginning of the fall term, and are required to take a prescribed and not an optional course, as previously noted.

The number of students in the department at the end of the College year of 1887 was sixty-seven. This included nineteen special students. The students come chiefly from New York State. New York, Pennsylvania and Ohio, together, sent forty-eight pupils. It is interesting to note that during the College year 1886–87, Troy and Rochester each sent three pupils. Buffalo, Utica, Auburn and Lockport, each sent two, while New York City was represented by a single pupil.

The degree of Bachelor of Science in Architecture is conferred after a satisfactory completion of the full course. Each student before taking the degree must submit to the faculty a satisfactory essay upon some artistic subject, and deposit a copy in the library. There are no post-graduate degrees in the department of architecture. The students are required to leave with the University all their rough studies made during the Junior year, and in the Senior year a single example in a class is retained in each term. Final drawings are required in order to graduate. Each pupil must average sixty, on a scale of one hundred, on his examinations and in class-work, in order to graduate.

The expense of the course at Cornell is quite moderate. The fee for tuition is $25 a term. Besides this, a fee of $5 is charged to every person taking the baccalaureate degree. The following is a fair estimate of the yearly expense:

Tuition, $25 per term,	$ 75
Room, board, lights, fuel, laundry, about	300
Text-books, etc., about	25
Total,	$400

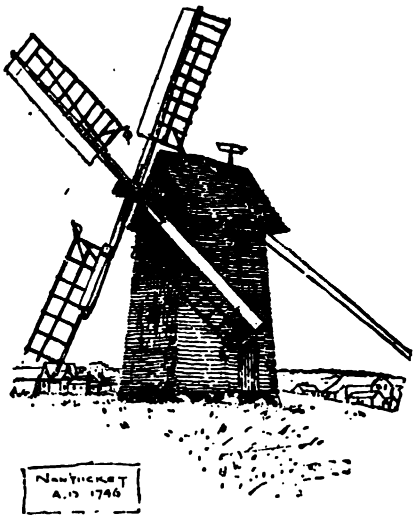
The expense of living in Ithaca varies for board, room, fuel, lights, from $3 to $7 per week. By the formation of clubs students may reduce expense from $3 to $2.50 a week for room and board.

Scholarships and fellowships for Cornell University were founded in remembrance of financial aid once given in a time of need by its trustees: Hon. Ezra Cornell, John McGraw, Esq., Hon. Henry W. Sage, Hon. Hiram Sibley and President Andrew D. White. One hundred and fifty thousand dollars have been permanently set aside to provide encouragement and assistance for students of high character and ability of either sex in the prosecution of college-work. The six scholarships of $200 each are awarded by competition, open to all students, held every September. The scholarships continue for four years, provided the students maintain the same high standard with which they enter. Students from the State of New York have the additional advantage of being able to secure State scholarships which are awarded by an Act of Legislature to the most meritorious applicants for admission to the University. The possession of a State scholarship gives a student the privileges of the University without any charge. The number of State scholarships is limited to one for each county. The Fellows are eight in number. Each one of these yields to the successful candidate the sum of $400 for one year, and, in case of remarkable merit, for two years. Fellows are expected to reside at the University, and to engage in work leading to a higher degree in their respective specialties. A Fellow need not necessarily be a graduate of the University. Each year there has been an architectural student who has held a scholarship, but there have as yet been no Fellows appointed from graduates in architecture.

[To be continued.]

PIPES MADE BY ELECTROLYSIS. — Steam pipes of copper are now made by electro-deposition from sulphate of copper solution. The pipe is formed on an iron core in the depositing bath, and the deposited copper is pressed by a moving tool as it is deposited, so as to give a fibrous strength to the crystalline copper. After the pipe is thus formed it is subjected to hot steam, which expands the copper shell, or pipe, clear off the iron core, thus separating the two. These pipes have no joint, and are said to be very strong, tests showing that they break with strains of from twenty-seven to forty-one tons per square inch. — *Exchange.*

AMERICAN WINDMILLS.



HERE and there in New England, upon the brow of some windy hill, there stands a low gray tower, from the top of which four long latticed spars, set in the four sides of a great shaft, stretch out against the sky. It is the wind-mill of our forefathers. The tapering form of the graceful tower, the radiating arms, the quiet color of the old shingled sides, make of this hoary ancient an architectural accessory of charming value in the landscape. The utility of most of them is a story of the past, the inventive genius of busier times having long since replaced their cumbrous machinery and comparatively-expensive construction with lighter and cheaper, as well as more effective wind-motors. The modern appliances have not, it is sadly evident, inherited the beauty of form distinguishing the older types, and the architectural treatment of the "patent" windmill still offers a problem of some interest for the future.

On a hill-top behind the town of Nantucket stands a fine old gray windmill tower, and I well remember the keen pleasure I felt on first catching sight of an arm of it over the house-tops. I hurried off to hunt up the fascinating bit of antiquity, if one may use such a term of anything American, and climbing the hill by a queer little crooked lane through the rear premises of some old houses, I was rewarded, on reaching the top, by a scene of quiet and restful beauty. On a turf of freshest green stood the old mill upon its base of crumbling field-boulders. Beyond a group of old farm-houses rose the modest eminences of the historic Popsquatch Hills, and to the right lay the heathered "plains," stretching away along the surf side from 'Sconset to Great Neck. The sun was nearly set, and in the clear purpling light the soft gray tones of the old shingled tower were wonderfully in harmony with the color of the whole picture. On a piece of broken millstone under the door I read the inscription: A. D. 1746.

The tower is eight-sided and has a roof, with two gables, the roof bulging at the eaves to cover the widest part of the tower in quaintly irregular fashion. The top is movable. Through one of the gables comes the shaft to which the arms are attached, and from the other extends to the ground a long timber, the boom, with a wheel on the ground-end by which the whole top is turned about to bring the sails in proper position to catch the wind. The old mill is a favorite subject for the amateurs who yearly invade the island, and perhaps no windmill in America has been more painted on big and little clamshells than has this sea-rimed veteran of old Nantucket.

The fabled prowess of windmills seems to have dwindled since that memorable day when the mighty arm of the wind-giant

unhorsed the knight of La Mancha. Tramping about one bright fall day among the hills of Orleans on Cape Cod I found three windmills of very good form, in a landscape which is admirably adapted as a setting for them. The hills are gently rolling and generally bare of trees upon the tops. Down between them lie pleasant little

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valleys, with winding roads, a sedgy pond or two, and pretty farm-houses under groups of handsome trees. The golden rod was glorious among the sere fall grasses. The coloring in the fields and the trees was everywhere delightfully warm. As I sketched away in great content at a very interesting conical-roofed tower near the village, a mill on the high hill beyond made sail, and I watched its white wings flashing in the sunshine as the great arms flew round in the freshening breeze.

At the north end of East Hampton stands the old mill-tower which has become famous on canvas since the summer tide of artist life set toward the Hamptons. The picturesque scene of which it is the centre has been somewhat marred since the advent of summer boarders and modern improvements in the sleepy old place. Two brightly painted new houses disfigure the foreground. In old times there was a low, mossy-roofed, tumble-down house, with its front smothered in climbing roses. The mill stands on a little hillock. The road, passing on the left, descends into a group of ancient oaks. In the

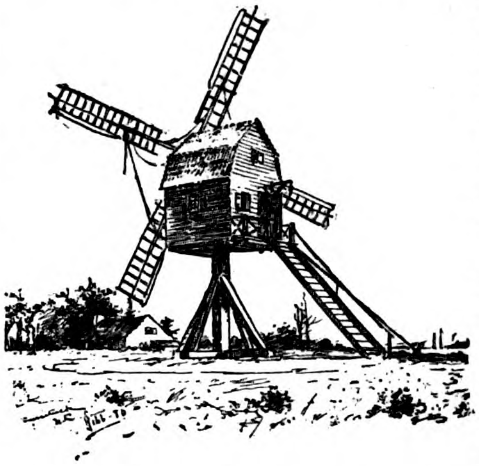
middle distance roll away the long brown backs of the uplands and beyond are the blue hills of the North Shore. The shingled walls of the tower have a wonderful charm of color. The edges of the long old cedar shingles have crumbled away with age, the lines are all softened down, and on the silver-gray ground-tone of their weather-beaten surfaces are countless irregular patches of lichen, in gray-greens and brilliant reds and yellows, producing a mellowness of color over the whole tower which is quite indescribable. This efflorescence of lichen is so thick on a mill which stands among the houses of Amagansett as to lend the tower an effect of having had a wash of burnt sienna.

At Bridgehampton I found a tall and stately mill-tower, with a conical roof in swelling lines of very happy effect. This mill is active, and when I saw it there was quite a busy air about the place. The great spars, with their brown canvas full spread, were sweeping round in majestic measure, while from out the tower sounded the deep rythmic rumble of the shafts and wheels. On a platform at the door was a mound of well-filled flour-bags, which a quaint old islander

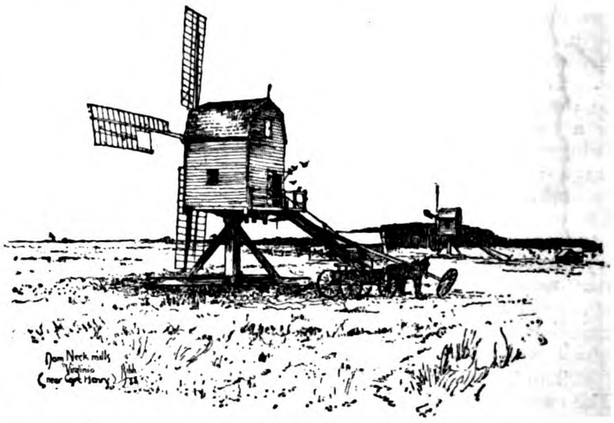
was loading upon his farm-wagon. The air was pleasantly filled with a floury mist, and a glimpse into the dusky interior revealed a wonderful harmony of great dark-toned timbers vailed in a maze of dusty cobwebs.

The westernmost wind-mill of all the Hamptons stands at the head of Town Pond in Southampton. Down under the hill are grouped some fine old willows, under whose shade is the much-begrimed village smithy. Beyond some cat-boats and skiffs ride at anchor. Down along the sloping green shores of the narrow pond are some very picturesque modern cottages, rich in the russets and yellows, faded greens and gloomy browns of shingle-stains, tones exasperatingly unlovely in the eyes of the natives, who have a strong affection for paint in brilliant hues.

I saw the mill at work, with old ragged sails stretched upon the latticed spars which slowly moved before a light easterly draught. The tower was silvery gray in the sunshine, with here and there a darker blot where the old shingles had been patched. Going in through a door in the stone base, which is about eight feet high from the ground, I climbed from floor to floor until I stood up under the roof where the great beam turned by the revolution of the spars comes in through the side and sets in motion the shafts and wheels of the rude machinery. On the upper side of the plate is a strap-iron rail upon which the roof moves on little iron wheels when pulled round to the wind. The hewn oak beams of the tower are large as well as old and tough, and the construction has an appearance of great solidity. From an upper window, through the cobwebs and dust which have been accumulating for generations undisturbed, I caught a glimpse of the arms of another windmill peeping over the house-tops at the lower end of the pond, and I shortly made my way thither. It turned out to be the original of a sketch of "Windmill Cottage" by Mr. Smedley, printed in *Harper's* not long ago.



This mill was hauled over from its ancient site in the Shinnecock Hills and set up here on the meadow behind the dunes, where it has, for a windmill, a somewhat pent and smothered look. The arms are still in place, and a number of pipes showing about the roof suggest



their use in pumping water up into the tower for domestic purposes. A porch over the door and a two-storied, commonplace cottage on the other side have not added to its beauty.

An old windmill looking out from the hill over Wellfleet Harbor on Cape Cod has also been metamorphosed into a dwelling and a very nice adjunct it makes, no doubt, to the house. Shorn of arms it has lost much of the old grace, but still groups effectively among the houses and trees on the hill-top.

Down along the shores of Pamplico and Currituck Sounds in North Carolina one meets some curious old windmills rather absurdly

perched upon one leg, upon which the whole house turns with the boom. At Dam Neck Mills, on the Virginia Coast below Cape Henry, are a couple of them, picturesquely grouped on a wide sand plain by the sea. But, though interesting, these mills have not the charm of the New England towers.

How well the Block Island mills fit into the characteristic landscape! Green-turfed downs dotted with low stone houses, white hilly roads winding between rough walls of field-boulders, here a lumbering ox-team creaking along the way, there a squad of hissing

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geese in solemn march, and far away on the breezy hillside a tapering gray tower, with wings outstretched against the sky and hanging ropes drawn from arm to arm in a sort of cobweb motive. So will I always remember them.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

THE MONUMENT TO MARIA THERESA, VIENNA, AUSTRIA.

[Gelatine Print, issued only with the Imperial Edition.]

FOR description see the *American Architect* for June 23.

DESIGN FOR A CATHEDRAL BY MR. J. B. HAMME. A THESIS DRAWING.

THIS presents one of the thesis drawings required of graduates from the Architectural Department of Cornell University.

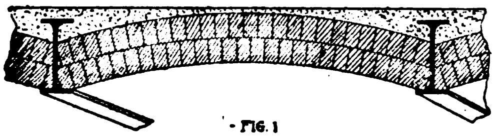
DESIGNS BY STUDENTS AT CORNELL UNIVERSITY.

DESIGN FOR A COUNTRY HOUSE. MR. R. H. ROBERTSON, ARCHITECT, NEW YORK, N. Y.

HOUSE FOR CONRAD SEIPP, ESQ., CHICAGO, ILL. MR. A. CUDELL, ARCHITECT, CHICAGO, ILL.

BUILDING FOR THE SOCIETY FOR SAVINGS, CLEVELAND, O. MESSRS. BURNHAM & ROOT, ARCHITECTS, CHICAGO, ILL.

PRACTICAL APPLICATIONS OF IRON AND CONCRETE TO RESIST TRANSVERSE STRAINS.[1]



- FIG. 1

CONCRETE composed of broken stone, fragments of brick, pottery, gravel and sand, held together by being mixed with lime, cement, asphaltum or other binding substances, has been used in construction to resist compressive stress for many ages.

The Romans used it more extensively than any other material, as the great masses of concrete, once the foundations of large temples, palaces and baths, the domes, arches and vaultings still existing, together with the core or interior portions of nearly all the ancient brick-faced walls found in Rome, testify.

In modern times, however, until the introduction of Portland cement, concrete has been used generally for no other purpose than for footings of walls and foundations underground.

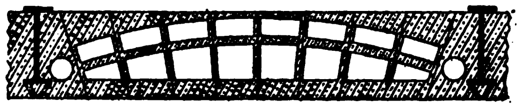
With the introduction of Portland cement, concrete construction has taken a more prominent part, and has advanced regularly with the perfection and general use of that valuable material, until not only foundations but the entire walls of buildings, piers and arches, floors and roofs, have been constructed of it, while moulded trimmings and ornamental blocks are cast of it and set in walls similar to cut-stone.

The cheapness, in most places, of the aggregates composing concrete, together with the fact that mixing and placing may be done with cheap and unskilled labor, under intelligent direction; its enduring and its fire-resisting qualities, together with its great compressive strength, all recommend it for use in permanent constructions. Its low tensile strength and liability to fail without giving warning, under tensile or transverse strain, has hitherto prevented its use for beams, lintels or floors, unless supported by iron beams or other means.

For thirty years or more, so-called fireproof floors have been constructed in England, and some parts of this country, by means of rolled-iron beams, with concrete or brick arches turned from the top of the lower flanges, and levelled over the top, as shown in Figure 1.

This method of construction fulfilled all requirements of strength and safety, except that for which it was especially designed: protection from fire. When subjected to the test of hot fires, its failure was conclusive and the cause apparent. The lower flanges of the iron beams, as the tie-member, and the most vital, being exposed directly to the heat, expanded with it, causing the beams and floor to sag with every increasing degree of heat; at the same time it lost its tensile strength, and failed utterly.

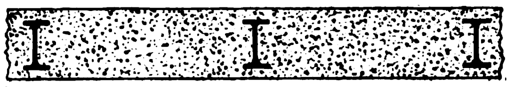
The next step, and the one generally practised at this time, was to encase the lower flanges of such beams with terra-cotta, plaster-of-Paris or other non-conducting materials, as Figure 2.



- FIG. 2. -

Among other methods devised was that shown in Figure 3, where the beams are entirely encased in concrete, extending two or more inches below and above the beams.

While contemplating this method of fireproof construction some twelve years ago, in England, the well-known inventor, Thadeus Hyatt, was led to consider if the iron used in the lower flanges of the beams could not be so united to the concrete as to work in unison



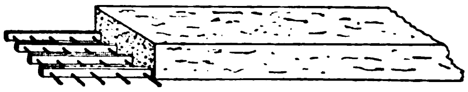
-FIG. 3.-

with it and form a compound beam or girder, the iron to serve only as the tie or tensile member, while the concrete formed the compressive member and connecting web.

Mr. Hyatt made many experimental beams, with the iron introduced in a great variety of ways — as straight ties, with and without anchors and washers; truss-rods in various forms; flat pieces of iron set vertically and laid flat, anchored at intervals along the entire length. These experimental beams were tested and broken by David Kircaldy, of London, and the results published by Mr. Hyatt in a neat form for private distribution, in the year 1877, for the use of which the writer is indebted to P. H. Jackson, a member of this Society, who, in a paper read before it on August 10, 1884, gave many of the results of Mr. Hyatt's experiments in detail, together with some of his own. The final conclusion of Mr. Hyatt, well demonstrated by his tests, was that iron could be perfectly united with concrete, and could be depended upon under all conditions for its full tensile strength.

The method Mr. Hyatt fixed on as the best was to use the tie-iron, as thin vertical blades placed near the bottom of the concrete beam or slab, extending its entire length and bearing on the supports at both ends; these vertical blades to be anchored at intervals of a few inches by round wires threaded through holes punched opposite each other in the vertical blades, thus forming a skeleton or gridiron, as shown in Figure 4.

This combination effected a saving of about two-thirds of the iron required in the method shown in Figures 1, 2 and 3, as the entire web and top flange was dispensed with, the same amount of concrete serving the double purpose.



- FIG. 4 -

Although this valuable discovery was given to the world ten years ago, it has not been generally adopted or extensively used either in this country or in England, at least such use has not come to the writer's knowledge, and this not from any failure in the application or defect in the system, but from the general disinclination to adopt new and novel methods of construction, however meritorious they may be.

For several years past Mr. Jackson, of this city, has experimented with this system, and with variations of his own suggestion, the testing of which has been witnessed by the author with great interest. The results of three of such tests will be given in detail from notes made at the time. The first test was made on January 16, 1884, on a tile of sidewalk-lights 12″ x 24″ and $1\frac{5}{16}$″ thick. This tile consisted of four rows of bull's-eye glass, ten in each row, with five blades of iron, $\frac{1}{8}$ x $\frac{5}{8}$ inches, extending lengthwise, and eleven wires of steel $\frac{3}{32}$ inches in diameter, threaded crosswise. The concrete consisted of one part Portland cement to one part fine screened gravel or coarse sand, and had been made forty-one days. This was tested by being supported on one-inch bearings at each end, leaving one foot ten inches between bearings. The weight was suspended from a steel bar, bedded in plaster, across the centre of the tile.

The deflection was accurately measured at frequent intervals as the load was applied, and recorded in 64ths of an inch.

[1] A paper by G. W. Percy read before the Technical Society of the Pacific Coast and published in the *Transactions* of the Society.

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TEST OF HYATT LIGHT SLAB, NO. 1.

Load.—Lbs.	Deflection.—64ths.	Remarks.
885	2	442 pounds to 1-64.
1198	5	$138\frac{1}{2}$ pounds to 1-64.
1376	6	
1545	7	
1717	8	
1906	10	73 pounds to 1-64.
2017	12	
2150	13	
2210	14	Fine crack observed.
2300	16	
2350	17	$37\frac{1}{2}$ pounds to 1-64.
2405	18	
2468	19	
2531	21	
2600	24	
2710	29	22 pounds to 1-64.
2750	—	Broke by crushing the concrete and glass near the centre bar, none of the iron rods breaking.

Fine cracks were first discovered when the load was about 2,300 pounds and the deflection $\frac{1}{4}$ inch. These cracks were directly under the cross-wires near the centre. The centre load of 2,750 pounds is equivalent to double the amount distributed, or 3,000 pounds for each square foot of surface between bearings, or a safe load of 500 pounds per foot, with factor-of-safety of 6.

Two tests on these tiles, with quite similar results, satisfied the writer of the strength, and he has not hesitated to use them in practice. The sidewalk-lights around the Fireman's Fund Insurance Company's building are constructed in this manner.

The next illustration of the strength of this combination of iron and concrete was recorded on January 19, 1884, at the Industrial Iron Works in this city, where a slab 4′ 6″ x 4′ 6″ x 3″ thick, made by Mr. Jackson, was tested. This slab had nineteen wrought-iron blades $\frac{1}{8}$″ x 1″ placed $2\frac{3}{4}$″ on centres extending through the slab in one direction and near the bottom, threaded by nine wires $\frac{1}{4}$″ diameter 6″ apart. Concrete composed of one part Portland cement to two of sand, and sixty-two days old, supported by bearing 3″ at each end, or at ends of blades, and loaded with pig-iron. Deflection noted in 32ds of inch.

TEST NO. 2.

Load.—Lbs.	Deflection.—32ds.	Remarks.
9,047	3	Or 3016 pounds to 1-32.
12,134	5	1531 pounds to 1-32.
15,167	7	
18,234	9	
21,111	10	Fine cracks first observed. 1442 pounds to 1-32.
24,149	12	
26,885	14	
29,554	16	$1353\frac{1}{2}$ pounds to 1-32.
32,747	18	
35,206	20	
36,375	—	Broke by parting all the iron blades on the line of wire nearest the centre; the concrete did not crush.

In loading the pig-iron care was taken not to bond it by laying any bars in the direction of the length of the blades, and therefore the pile assumed a somewhat a pyramidal form near the top, thus throwing more weight toward the centre of slab. A fine crack was first observed when the load was about 20,000 pounds and the deflection $\frac{1}{8}$″. This breaking load was equal to 2,000 pounds per square foot, or safe load of 333 pounds per square foot, with factor-of-safety of 6.

But one other test of this method will be given, and this was made on the 31st of August, 1885, at the Industrial Iron Works.

Mr. Jackson had prepared a beam 7″ x 14″ in section and 10′ 6″ long. Near the bottom were seven vertical blades of iron extending the entire length; three of these were $\frac{1}{4}$″ x 1″ and four were $\frac{1}{8}$″ x 1″, with $\frac{1}{4}$″ wires threaded through every 3″. Near the top were bedded two cast-iron rope moulding bars, to assist the compressive strength of the concrete (an unnecessary precaution). The concrete at top and bottom, for about 4″, was one part cement to one of sand; centre portion, one of cement to two of sand. The beam was supported by 9″ bearings at both ends, thus leaving it 9′ in the clear between bearings. It was loaded with pig-iron piled across the beam and bonded only with thin hoop-iron.

Several architects and engineers were present at this test, among others Professor Soulé, of the State University.

The writer had received from Mr. Jackson, a day or two before, all the data in reference to the beam, including its age (about five months). He had estimated its strength based on a tensile strength of 60,000 pounds for hoop-iron, and expressed his confidence to several gentlemen that the beam would require about 27 tons to break, and that it would deflect an inch before breaking.

The result shows nearer than could be expected from calculation on the strength of any materials. Deflections are here noted in 32ds of an inch.

TEST NO. 3.

Load.—Lbs.	Deflection.—32ds.	Remarks.
20,695	2	10,363 pounds to 1-32.
30,989	3	
33,589	4	1,187 pounds to 1-32.
36,045	8	
38,113	9	
40,056	12	630 pounds to 1-32. Cracks first observed.
42,062	16	
44,077	18	
45,678	21	
46,115	23	475 pounds to 1-32.
47,018	24	
47,996	26	
49,001	28	
50,054	30	369 pounds to 1-32.
52,052	36	
52,692	38	
53,654	—	Broke by separating all the longitudinal blades on the line of one of the cross-wires near the centre.

As will be seen by the above, the breaking load was 26.8 tons and the deflection just before breaking $1\frac{3}{16}$″. Fine cracks were first observed at two or three of the wires near the centre when the load was about 42,000 pounds and the deflection $\frac{1}{2}$″.

This breaking-load of 53,654 pounds was equal to about 6,000 pounds per foot, or 1,000 pounds per foot with factor-of-safety of 6, which would evidently be a perfectly safe permanent load, as the deflection with 9,000 pounds was too slight to observe.

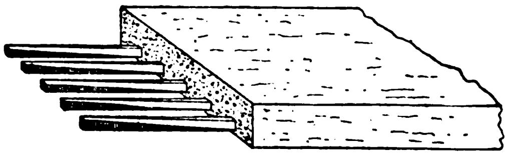
These experiments, together with the results of Mr. Hyatt's tests in London, should satisfy the most sceptical of the practicability of obtaining the full tensile strength of iron as a tie in concrete constructions.

The only objection to be urged against the practice of this method is that, by punching holes for the cross-wires, the effective area of the tie metal is reduced by the amount of the diameter of the holes, and the labor of punching holes and threading wires is quite an item of the cost.

While these experiments were going on Mr. E. L. Ransome, also a member of this Society, and a very successful worker of concrete, was experimenting with a different method of obtaining the same result.

For several years he had used old wire cables as a bond in concrete walls, the irregularity of the wire ropes, caused by the twist of the strands, preventing the possibility of slipping when imbedded in concrete. This probably suggested to his mind the idea of twisting square bars of iron or steel and imbedding them in the bottom of concrete girders or flat slabs, as shown in Fig. 5.

It was evident that this method would be a great improvement over that invented by Mr. Hyatt. The twist in the bar[1] would cause it to be held securely at every point along its length, instead of at intervals of several inches; no metal would be wasted by punching holes, and no extra iron required for anchors. The labor of twisting the cold rods would be but a trifle, and the entire sectional area of the iron could be placed just where it would be most effective.

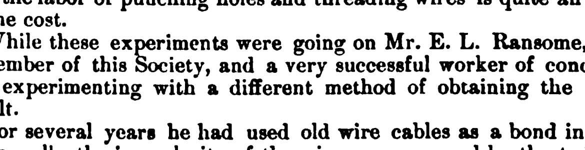


·FIG 5·

Mr. Ransome promptly patented his improvement and since 1885 it has been used quite extensively in this city [San Francisco].

The results of two tests of this method, witnessed by the writer, will be given, together with several different applications he has made of it in practice.

The first test was of a slab 12″ wide, 6″ deep and 18′ long, composed of one part Portland cement to five parts gravel and broken



– FIG. 6. –

granite, with six twisted rods $\frac{1}{2}$″ x $\frac{1}{2}$″ imbedded near the bottom. When about four months old, the slab was tested by being placed on blocks bearing 12″ at each end, leaving 16′ between bearings, loaded uniformly with sand piled on planks laid across the slab. Such a slab without ties could hardly be expected to sustain its own weight. The deflection was noted in $\frac{1}{4}$ of an inch.

[1] It has been demonstrated by experiments that the process of twisting the bars to the extent desired strengthens the rods instead of weakening them, as might be expected.

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TEST NO. 4.

Load. — Lbs.	Deflection.	Remarks.
2,830 3,640	¼ ½	} = 1,820 pounds to ¼.
4,450 5,260 6,070	¾ 1 1¼	} = 810 pounds to ¼.
6,745 7,420 7,960	1½ 1¾ 2	} = 630 pounds to ¼.
8,500 9,040 9,580	2¼ 2½ 2¾	} = 540 pounds to ¼.
9,985 10,390	3 3¼	} = 405 pounds to ¼.
10,660	—	Broke by crushing the concrete about two feet from the centre. The slab split for some distance each side of the fracture near the centre of thickness, or at the neutral axis.

The results of this test were given in a meeting of this Society, as before stated, on August 10, 1884, at which time a fragment of the slab was exhibited, showing the position of the rods and the quality of concrete.

The result of the next test, although very interesting, cannot be given in detail, as it extended over several months, and was visited but two or three times by the writer. It consisted of a full-size section of a sidewalk arch and beam, as shown by Fig. 6, 5′ 6″ wide, 15″ deep at beams and 6″ thick at centre of elliptical arch, and 16′ between bearings. At 2″ from the bottom of each side, forming the beam, were 1½″ x 1½″ twisted rods, one in each side.

As it was evident this would require a very heavy weight to break it, preparations were made by laying four thicknesses of 2″ plank across the top of slab, and projecting several feet on both sides. On this platform a strong frame was built, 15′ long (from bearing to bearing) and 11′ wide (just double the width of slab). The sides of this frame-work were not attached or secured to the plank platform so as to assist in any degree in supporting it. The frame-work was filled with clean sand, confined by planks, and the weight estimated by the cubic foot of sand at 100 pounds per cubic foot.

Load. tons.	Deflection. inches.	Remarks.
20	about ⅜	
50	" 1½	Cracks on under side about 12 inches apart in centre third.
75	" 4	Cracks extending about 6 inches up.
90	" 6½	Several cracks ½ inch open at bottom and extending to within 2 inches of top when last seen by writer.

After standing in this condition for two or three days, more sand was added, when the concrete crushed near the centre.

Before analyzing the remarkable results of this test, let us consider the proper method of estimating the strength of such composite beams.

First, we must consider what is to be the effective depth of such a beam. It is evident the centre of the tie-rods must be taken as the centre of lower member, but the centre of upper member is not so easily located, though it must lie near the top of the concrete.

It is evident that all the concrete above the neutral axis is subject to compressive stress — that stress being greatest at the top surface and diminishing regularly to the centre. It is also evident that as a beam deflects (and concrete, as is well known, yields very little to compression) nearly all the strain must be met by a comparatively thin portion at the top.

It has appeared reasonable to the writer to assume the centre of the top member as one-twelfth of the distance from the top surface to the tie-rods, and to consider that the concrete ($\frac{1}{12}$ of the depth) above and below this line must be sufficient to meet the compressive stress. Thus, if a beam is designed with a total depth of 15″ and the centre of tie-rods placed 3″ above the bottom of concrete, it would leave 12″ as the entire depth from top surface to centre of lower member. One-twelfth of this distance would be 1″ as the centre of top member, thus leaving as effective depth of the beam 11″ and the thickness of top member 2″. Then if a 1″ x 1″ bar, with tensile strength of 25 tons, is used for the lower member and concrete that would crush with one ton to the inch at the top, the beam should have a width of 12½″ to equalize the strength of the iron.

This is the rule the writer has used and believes it errs on the side of safety.

Now, taking the sidewalk arch, as given above, and applying this rule and the usual formula for the strength of iron beams, we have as follows:

Length of beam between bearings	16 feet.
Depth from top to centre of rods	13 inches.
Effective depth — about	12 inches.
Area of iron in tie-rods	4½ inches.
Area of concrete in upper surface, 2 inches thick =	132 sq. inches.

Then formula for breaking-weight at centre of iron bears =

$$\frac{\text{Depth} \times \text{area of iron in flange} \times 80}{\text{Length}} = W \text{ in tons.}$$

$$\frac{12'' \times 4\tfrac{1}{2}'' \times 80}{162''} = \frac{360}{16} = 22\tfrac{1}{2}$$ tons breaking-weight at centre, or 45 tons distributed load.

As this formula is based on the breaking strength of iron at 20 tons per square inch of section, and good grades of iron will require at least 25 tons to break by tensile stress, we may add 25 per cent to this result, and consider that from 56 to 60 tons load on the arch and beams should break the rods with tensile strain. Applying the formula for strains with 60 tons load we have this result: $\frac{60 \times 16}{8 \times 1} =$ 120 tons tensile strain on 4½″ iron; also, 120 tons compressive strain on 132 square inches concrete, composed of one of cement to five of aggregate and five months old, which might reasonably be expected to carry one ton per inch.

It will be seen by the tables of weights and deflections of beams, that with about one-third of their breaking-load the deflection was only about one-twelfth of the greatest deflection, and that the load required to produce a given deflection decreased regularly from the first. This may be readily accounted for by the fact that iron yields to extension quite regularly one ten-thousandth of its length to each ton of load per inch until its limit of elasticity is reached, and then it yields more rapidly and in increasing ratio until some grades of iron will stretch one-tenth of their length before final rupture.

As concrete does not yield to compression more than about one one-thousandth part of its length before crushing, it is evident that as deflection increases in beams of this construction the neutral axis must move upward or nearer the top member, thus making less proportional strain on the lower and more on the upper member. This was very apparent in the last test noted, for when last seen by the writer, the cracks due to extension had reached to within two inches of the top of the slab, showing conclusively that the neutral axis must be still higher.

Now, while this may account very satisfactorily for the iron rods not breaking, as they then had a leverage of at least ten inches from the neutral axis, it does not account for the concrete not crushing, as the entire area of concrete then above the neutral axis could not be more than 100″ and its greatest leverage about 1½″, the stress would amount to the enormous load of 4.8 tons per inch for 60 tons load and 7.2 for 90 tons. It is incredible that concrete of such quality could resist such stress for a moment.

It appears to the writer that some of the compressive strain must have been transmitted to the four thicknesses of plank forming the bottom of platform, and some of the load by friction at the sides. If this be so, it renders this experiment worthless so far as the ultimate strength is concerned, but could not affect the early stages of deflection. This arch and beams were designed to carry 400 pounds to a square foot, or total load of 16½ tons with safety. When loaded

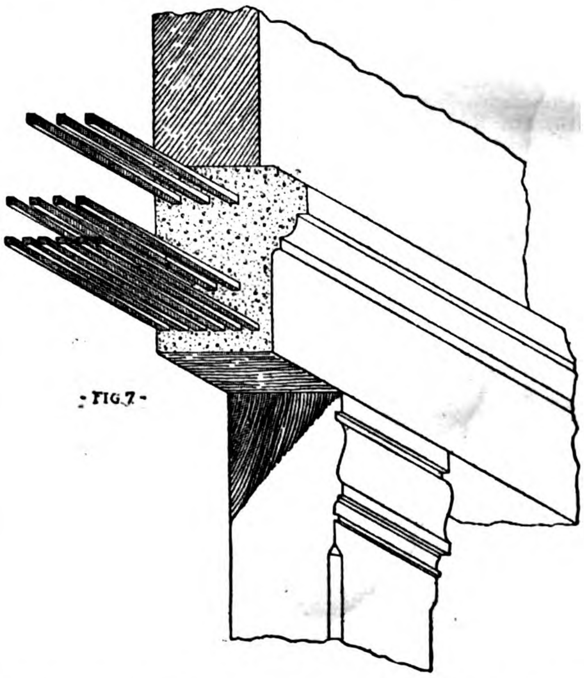

FIG. 7

to that extent, its deflection was only about ¼″. At this stage it could not have been relieved by the planks or the friction of sand on sides of curbing. The fact that such construction will deflect so much before breaking is a point in its favor, as it gives ample warning when it is overloaded. There have now been laid in this city about 50,000 superficial feet of sidewalk with spans from 10′ to 22′, and no sign of failure or deflection under the heaviest loads that have been placed on them. The writer has applied this system in a variety of ways, some of which will be noted. In the building on the north-east corner of Washington and Stockton Streets, the lintels over store fronts 15′ clear span and carrying three stories of brick walls and wood floors, are of concrete 22″ wide, 2′ 10″ high (with belt course moulded on), and ten 1″ rods placed near the bottom

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(Fig. 7). These lintels extend along both fronts of the building, and over the supporting piers are placed three 1″ iron rods near the top, thus giving the effect of a continuous girder, although they are not needed for strength. The lavatory floors in this building are constructed as flat slabs, 6″ thick, 10′ span, with ½″ x ½″ rods every 6″ and placed 1½″ from bottom to centre of rods. Other fireproof floors have been constructed both with flat ceilings, beams and panels, and beams and arches.

In preparing the underground cisterns at the residence of A. Hayward at San Mateo this method was employed with most satisfactory results. The entire cisterns, filtering chambers, flat tops,

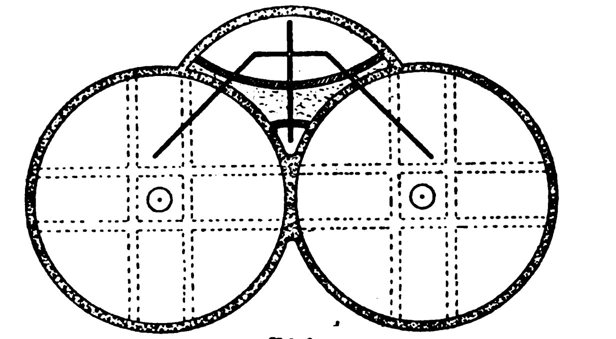


FIG 8.-

curbs, and surmounting vases, were all executed in concrete, with two 1¼ x 1¼ rods in each of the deep beams crossing each other on each side of the centre curb, as shown in Figs. 8 and 9. These cisterns are each 27′ in diameter and 15′ deep. The top is covered

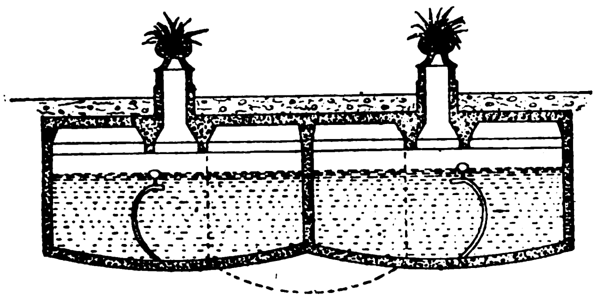
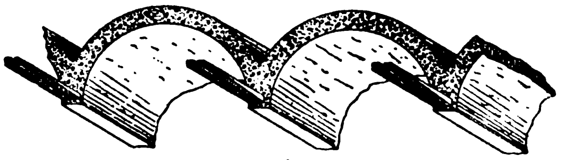


FIG.9

with 2′ of earth and drays loaded with iron pipe have been driven over them, although the top was designed to be in lawn and not intended for traffic.

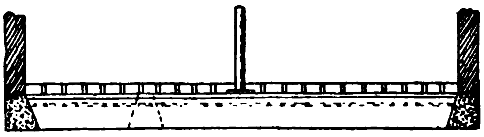
In 1885, Mr. Ransome erected the building for the Arctic Oil Company's works in this city, and made the roof over a fireproof warehouse in the manner shown in Fig. 10. Mr. Ransome describes it in this manner: "This roof is 75′ long by 25′ wide between the walls, which are its sole support. It consists of a number of winged beams, which, being made and jointed side by side, form the roof in a series of semicircular arches, having a diameter of about 3′ and a



-FIG 10-

thickness of 4″, each beam containing two twisted iron bars 1″ square and 26′ long, placed about 2″ from its bottom. Its calculated strength, verified by experiment, is eight times its constant load. Upon removing all temporary supports and scaffolding on the tenth day, the roof did not show any deflection, although carefully measured to within an eighth of an inch."

In building a brick warehouse in Stockton in 1885 on newly-made ground, the hard-pan being from 12′ to 15′ from the surface, and desiring to save the expense of continuous foundations of such depth, piers of concrete were put in about 15′ apart and with footings on the hard-pan.



-FIG 11-

At the surface of the ground a base-course of concrete was formed with twisted rods of proper size extending from pier to pier. On this base-course and girder were built the brick walls of the warehouse. In one or two places slight cracks appeared over the piers, which were evidently due to uneven settling.

In one other case, while constructing a brick building of two stories on very soft ground near our city front, the twisted rod and concrete combination was applied in the manner shown in Fig. 11. The footings of the side walls were not allowed to spread out on the adjoining property. Cross walls of concrete were built every 14′, 3′ wide on the bottom and 3′ high, with two 1¼″ twisted rods in each near the top, as it is evident the tensile strain would be in that member. On the centre of these cross walls rest the columns supporting the girder of second floor, while the first floor beams are parallel with the side walls and rest directly on the cross walls, thus distributing the weight of first floor and its load over the entire area. Some settling took place during the erection of this building and several of the cross walls were cracked before the building was finished. No settlement has been observed since and the brick walls have not cracked. The results in this case were as good as could be expected with a great depth of soft mud below. In such situations the entire area of the building should be covered with concrete and the rods placed as high as possible.

Twisted rods of iron or steel imbedded in concrete walls, floors, and ceilings of bank-vaults form a good burglar-resisting substance, as well as being fireproof. On one occasion, while building a concrete bank-vault in an interior town, several tons of worn-out steel plow-shears were placed in the concrete in such positions as would be most likely to discourage burglars in attempting to cut through the wall.

Enough has been said to show the practical character of such combination of iron and concrete in building construction, while many other applications will suggest themselves to the architect and engineer, as in the construction of domes, spires and tall chimneys; in bridges, dams, aqueducts and reservoirs it could often be used to great advantage in strength and economy. To suggest one great national undertaking where the writer believes better results could be obtained at less than half the cost of the present work: the Eddystone Light-houses, both as built by Smeaton and the one recently completed. When one considers the great expense of the intricate dovetailing of the stones together, the trouble in handling and dowelling such masses and the comparatively shallow depth of the anchorage, and then consider that if built with concrete and iron it could be anchored with any number of twisted rods extending to any desired depth into the rock and grouted in with cement, holding at the lower end like the deep and spreading roots of a tree, while at the other end the rods could reach to the very summit, holding with an iron grip the cap-stone to the lowest depth; furthermore, for less than one-third the cost of stone, worked as was the stone in the Eddystone, Bellrock and other light-houses of that class, a concrete could be prepared of Portland cement, dense stone and iron shavings that would be 30 to 50 per cent heavier than granite and better to resist the action of water, while the trouble and expense of placing in permanent or temporary iron curbing would not be so great as handling the cut stone. It has been demonstrated on this coast that good concrete foundations for large engines are much more satisfactory than those built of brick or stone. Now, the writer would suggest that the bolts holding the engines to such beds should be of twisted square iron, thus taking a firm hold at all points through their length and not simply at the lower ends. For setting anchors, bolts or other fastenings in concrete, it is only necessary to twist square or flat bars of iron and imbed where wanted. Iron thus imbedded in Portland-cement concrete, with sufficient thickness of cement around it, is perfectly protected from rust as well as fire, and cannot deteriorate with age. The writer believes the discovery to be of great value to the building world, and that its application will extend as its merits are appreciated and before many years will become general.

SOCIETIES

MAINE ARCHITECTS ADOPT A UNIFORM SCALE OF PRICES FOR THEIR SERVICES.

THE First Annual Dinner of Architects of Maine took place at Preble House, Thursday evening last. The most important business discussed was that of arranging a uniform rate of charges for architectural service. Previously the rate charged has been two and one-half per cent for plans and two and one-half per cent for superintendence, this percentage being reckoned on the total cost of the building. This division of charges was not in accord with the rates adopted by the American Institute of Architects, which are three and one-half per cent for plans and one and one-half per cent for superintendence, making the same total of five per cent on cost for full services.

The rates fixed by the American Institute were unanimously adopted at Thursday evening's meeting. This gives a just division of charges, the old rate of two and one-half per cent charged for drawings and specifications without superintendence being inadequate. The new rates above quoted apply to work costing more than $5,000. For work costing less than $5,000 a list of special rates has been arranged.

It has been erroneously stated that this new schedule of charges

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was made after consultation with many of the leading contractors. No such consultation was needed, it being evident to the architects themselves that a readjustment of prices was necessary in order to ensure a fair recompense for architectural service.

The architects present at the dinner were Messrs. Fassett, Stevens, Cobb, Dorticos and Thompson, of Portland, and Mr. Coombs, of Lewiston. Letters were read from Mr. Lewis, of Gardiner, and Mr. Mansur, of Bangor, expressing their readiness to adopt the schedule agreed upon at the meeting. — *Portland Sunday Telegram, Sept.* 23, 1888.

SCHEDULE OF CHARGES ADOPTED BY THE ARCHITECTS OF THE STATE OF MAINE.

For full professional services, exclusive of time lost in travelling and travelling expenses:

For new work costing over $5,000, 5 per cent on cost; 3 1-2 per cent for plans.

For warehouses and factories, 3 1-2 per cent on cost; 2 per cent for plans.

	FULL SERVICES.	FOR PLANS.
For new work costing between $4,000 and $5,000	5 1-2 per cent	4 per cent
For new work costing between $3,000 and $4,000	6 " "	4 1-2 " "
For new work costing between $2,000 and $3,000	6 1-2 " "	5 " "
For new work costing between $1,500 and $2,000	7 " "	5 1-2 " "
For new work costing under $1,500	7 1-2 " "	6 " "

Preliminary studies for work costing over $5,000, 1 per cent on cost.

If preliminary studies only are made, and are used for building, the full payment for general plans will be exacted.

For additions and alterations, an additional charge for measurements.

For monumental and decorative work and designs for furniture, 10 to 20 per cent on cost.

For fixed interior woodwork, 15 per cent on the cost.

Commissions are reckoned upon the total cost of the work, including permanent fixtures necessary to render it fit for occupancy, whether these are selected by proprietor or architect, valued as if executed entirely by new labor and of new materials.

For purchase of stuffs and furniture, 10 per cent on cost.

Travelling expenses to be added to the charge.

Where full services are required, a payment of 3 1-2 per cent on contemplated cost is due on completion of the general drawings and specifications.

Drawings must be paid for whether the work is carried out or not.

Drawings and specifications are instruments of service and the property of the architect.

Builder or contractor must compute all quantities. No bills of quantities will be furnished by us, as this is not within the province of the architect.

Architectural supervision consists of such occasional visits as may be necessary to ensure the conformity of the building to the design indicated by drawings and specifications. We do not agree to exercise the close supervision of a clerk-of-the-works; nor to be responsible for the failure of mechanics to conform to the standard of workmanship called for by drawings and specifications.

ARCHITECTURAL LEAGUE.

AT the first fall meeting of the League, held October 1st, over fifty members sat down to dinner. In the absence of the president, F. Crowninshield presided. The Committee on Current Work announced that the annual architectural excursion had been postponed to the winter season, and that Washington, D. C., had been chosen. Meantime it is arranged to take short trips around New York once a month and give League members an opportunity to see some of the best interiors the city can boast of.

It was voted to incorporate the League at once, in order that any subsequent steps as to a club-house or importation of foreign drawings for the exhibition might be more easily provided for.

The election for the jury for the fourth annual exhibition resulted in the choice of the following: R. M. Hunt, C. F. McKim, R. S. Peabody, T. P. Chandler, Jr., A. D. F. Hamlin.

The Hanging Committee was elected as follows: George A. Glaenzer, E. M. Wheelwright, C. B. Atwood.

The jury for the League gold and silver medal competition, open to draughtsmen under twenty-five, was chosen as follows: C. F. McKim, R. S. Peabody, C. T. Mott, C. A. Rich, E. R. Tilton. In connection with this competition it is understood that the subject for this year's competition is to be the tomb of an illustrious architect.

Definite action in regard to the club-house project was postponed until the November meeting. * * *

BOSTON ARCHITECTURAL CLUB.

AT a preliminary meeting held in the office of Messrs. Cabot, Everett & Mead, August 27, this committee was appointed to prepare suggestions and make necessary arrangements for the organization of an Architectural Club. The committee would therefore report as follows:

The object of this organization is primarily to create and foster artistic fellowship between those who feel an interest in the subject of architecture, and to aid the members of the profession toward a higher standard of thought and design. The aims are therefore sufficiently comprehensive to embrace not only those who are engaged in the practice or the study of architecture, but also those engaged in other branches of the fine arts, as well as the larger class who would be one with us in instinct and tastes though engaged in other pursuits. We are to organize, in other words, an artistic club, whose chief direction shall be in the lines of architecture, the mother art. But that our growth be large and liberal in its scope, we need the association with the painter and the sculptor, who view art from a purely æsthetic standpoint, no less than with the educated art patron, who often judges of the work of our profession entirely by its practical efficiency. It is the belief of the committee that only by so extending the range of the organization can it ever attain to a permanency, or acquire the influence which we should all desire for it.

It is not the intention that this club shall be in any sense a rival of the Boston Society of Architects. We are working on entirely different lines and expect quite different results, besides being less restricted in our organization. Our interests and our sympathies are one with the society, and it is the hope that our membership will largely include the members of the Society of Architects, for this club is by no means simply an association of draughtsmen, nor are there here any distinctions of persons. We are all united on the common ground of our artistic sympathies, and our architectural interests.

It is believed that it would be a mistake for the club to involve itself in any extended machinery or to indulge in any more red tape than is absolutely necessary for the purposes of the organization. Let the first thought be that of artistic intercourse, the mingling of kindred souls, the rubbing of bright ideas against each other, the cultivation of architectural sociability, and the constitution and by-laws will take care of themselves. Then, as the need therefor makes itself felt, we can have within our midst classes in sketching, life classes, or competitions in design; all of these, however, being purely voluntary, and limited therefore to those who feel a real interest in such things and are willing to give the time to it. In this way the work will perhaps be small in quantity, but it will be earnest and faithful; and when the interest flags, the life of the club will not be necessarily diminished, as has been the case with so many clubs which were restricted to sketches and competitions. For those who have no time for studies, we hope to have pleasant reading-rooms, with all the architectural papers of the world on file, with ultimately a collection of photographs and a good reference-library. There will be also, as a possibility, a comfortable lounging-room where the members can meet in the odor of architecture, smoke friendly pipes, slander each others' latest productions and gossip over the architectural oddities; while the club-rooms would be at the disposal of visitors from abroad, who could make their headquarters with us. Besides this the club would have receptions at stated intervals, with occasional exhibitions, suppers, etc. All of these ideas are entirely in embryo, as yet, but are perfectly natural developments of a club established on such principles as this.

The influence of such an organization, if faithfully carried out, cannot be too highly estimated. What has been possible with the Royal Institute of British Architects and the Architectural League of New York can surely be accomplished in Boston. There is no lack here of either a vacant field or public sentiment. All we have to do is to start the ball rolling in the right track.

At a meeting held September 18, at which nineteen persons were present, this report was adopted and the committee elected to the offices named. It was voted to call the organization the Boston Architectural Club, and to take such steps as might be necessary to interest the profession generally in the enterprise.

The club has the refusal of rooms at Room 10, No. 6 Hamilton Place, where a meeting was held Thursday, October 4, at 7 P. M., to consider further action. All interested are invited.

C. H. BLACKALL, *President.*
RICHARD G. SCHMID, *Treasurer.*
W. T. PARTRIDGE, *Secretary.*

COMMUNICATIONS

MODERN HOUSE DRAINAGE.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Probably no change in the art of house-construction during the past ten years has been so great as that in the relative importance attached to the arrangement of apparatus for the convenient holding of water for its several uses and its speedy and safe removal after such uses.

Formerly the planning and construction of the plumbing of a house was left entirely to the plumber. To most house-builders, the including of plumbing with religion and thorough bass, as subjects too sacred to be talked about, would have been readily acquiesced in. The mystery that hedged about the work of the man with tongs and ladle was rarely sought to be penetrated. It is still true to-day that less is known by the owner of the drainage of his house than of any other part of it, but the necessity for *some* knowledge is much better recognized than formerly.

The recent great awakening in regard to general sanitation has borne fruit. This fruit is seen in the greater interest which house-owners take in their local drainage, in the greater importance attached to the subject by architects, in the very considerable literature which has sprung up about it, and in the rise of a new profession — that of men who make a specialty of house and town drainage under the general name of "sanitary engineers."

The foundation of a system of drainage is the soil-pipe, the main artery. The fixtures in the house should be so grouped as to give

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the least complication and the shortest runs of waste-pipe, the connections between the fixtures and the soil-pipe. The soil-pipe itself should be run full bore through the top of the roof. As a rule, all piping, whether soil or waste pipe, should be put where it will be seen. Concealed work is apt to be poor work. Also, in case of damage by frost or otherwise, the immediate and accurate location of such injury is important and economical. The soil and waste pipes being erected, the selection of fixtures demands attention. The value of an otherwise good system of drainage may be quite destroyed by the use of improper fixtures.

Water-closets perhaps come first in importance. These should hold a good depth of water to receive deposits and to prevent the extrusion of drain air; their shape should be such as to prevent the fouling of their walls, and their flushing at each discharge should be thorough and copious. Their setting should be open, with no confined space about them.

Wash-bowls should be without concealed overflow or plug and chain. Late improvements in connection with standing overflows make the latter device the only proper one.

Bath-tubs should be of sufficiently heavy copper or other material to make them durable. The standing overflow and waste, to the exclusion of the concealed overflow and plug and chain, is here of even more importance than in the case of wash-bowls, and the size of the outlet should be so large as to deliver the water from the tub into the drainage system rapidly and with all the scouring effect of which such a large body of water is capable.

Sinks should be large enough to give ample room and should have special provision for preventing the clogging of their waste-pipes by congealed grease. The so-called "grease-traps" do this partially, but only by providing another receptacle to become clogged.

Where set laundry-tubs are used they should be of some non-absorbent material.

Each fixture (except the water-closet, whose trap should be in its bowl) should be trapped, as close as possible to its outlet, with a trap of good seal and not subject to siphonage. N.

SCHOOL ARCHITECTURE.

SEPT. 7, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,— Will you kindly inform me where the work on School Architecture by Mr. E. R. Robson, mentioned in your issue Sept. 1st, can be obtained and the price of the same.

Yours respectfully, T-SQUARE.

[ORDER through any bookseller, or write direct to B. T. Batsford & Son, 52 High Holburn, London, for price. On receipt of money order for the amount with enough to cover postage, they will send it by mail, and the duty will be collected at the Post-Office on delivery. The cost will be from $8 to $12, according to the condition of copy sent.—EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS

SUIT OVER A CLOCK.—The case of Mrs. Amy F. Cole vs. Misses Laura O. and Emily Wheeler (better known as the Sharon bell case) was tried before the superior court, with Judge Torrance presiding, at Litchfield, Ct., last week. In 1885, the Misses Wheeler, wealthy ladies from New York and having a summer residence in Sharon, leased of Henry J. Taylor a small parcel of land in the village of Sharon, directly in front of the Sharon Hotel and within about 120 feet of it. Upon this lot they caused to be erected a handsome stone tower, about 60 feet high. In the top, which was uninclosed, was placed a large bell weighing 2550 pounds, and a clock arranged to strike (with a steel hammer weighing between 60 and 70 pounds) the hours of the day and night. The clock began striking in October, 1885, at a time when the guests of the hotel had returned to their homes in the cities. In the spring and summer of 1886 it was ascertained that the very loud noise made by the striking of the clock was annoying to the guests of the hotel. In the spring of 1887 the Misses Wheeler consented that the striking of the clock should be discontinued during the summer months. In July, 1887, a petition was circulated in Sharon, requesting the Misses Wheeler to begin the striking of the clock again "as soon as may be without injury to any." In the latter part of July, 1887, the Misses Wheeler notified the manager of the hotel that the striking of the clock would be resumed Sept. 1, 1887. On the thirty-first day of August, 1887, a temporary injunction was served upon the Misses Wheeler, restraining them from striking the clock. A large number of depositions, 70 or more, were taken by the plaintiff and defendants in New York and Sharon, and on Tuesday of last week the trial began before Judge Torrance at Litchfield. Between two and three days were occupied in the trial, and, after the arguments for the plaintiff and for the defendants, it is reported that the judge, without intimating what his decision would be, suggested enclosing the west opening of the tower nearest the hotel, and that other steps be taken to lessen the noise. It is understood that the Misses Wheeler will consult their architect as to the best way to lessen the noise, and that, acting upon the suggestion of the court, they will try and remedy the inconvenience.—*Boston Herald.*

PINE TIMBER AT QUEBEC.—It is reported that not a stick of square white pine remains unsold in the hands of lumbermen at Quebec, Canada, all that is in port and all of this year's cut that is to arrive having passed into the hands of shippers—a condition of things never known at that market before. It is also said that there are only 30,000 feet of waney board pine yet unsold to arrive, and that is this year's cut. Thus it is probable that the smallest stocks on record will be wintered over. This will be an incentive toward reasonable activity in the woods, but it is believed the most of the lumbermen will take care that the market is not overstocked, especially since stumpage is commanding enhanced figures. Yet from Montreal it is reported that big preparations are being made for the winter's operations, for should there be a removal of the United States customs duty on lumber, manufacture would be increased at Ottawa and other important points, and logs would be in demand. Prices for lumber at the mills are reported lately increased. The Canadians appear to be looking for a boom in lumber.—*Northwestern Lumberman.*

TRADE SURVEYS

THE most salient feature in American industrial activity is the decentralization of industries throughout all States and Territories. This movement has been accelerated by the anxiety of American and foreign capital to seize the advantages which are presenting themselves on every hand. The low prices of raw material and its abundance, low prices of labor and its disinclination for agitations for higher wages, low rate of money and expansion of railway facilities into so many new quarters and abundance of the supply of fuel, raw and artificial, and other advantages have been stimulating these movements also. The movement has only started. Capital now sees more clearly than before all the opportunities in view. The depression in prices which has taken place this season has been the deciding point. Up to this year capital was apprehensive that the limit of enterprise had been reached for the time being and that the production was abundantly equal to all requirements that might be presented for a year or two. A multitude of things are at hand to prove that there are now five opportunities where there was one three years ago for profitable investment and business capacity and enterprise of all kinds. The most encouraging feature which has presented itself during the past three months is the projection of a large amount of railway building. Some twenty or thirty lines of over one hundred miles have been determined on in that time. One of these enterprises worthy of notice is the construction of a four hundred mile road connecting the Mexican National with Mexican Central, passing through the Coahuila coal-fields and Laguria cotton-belt and the Sierra Mojada mining district. This mining district now produces 60,000 tons of traffic per year, which can be vastly increased by proper railway facilities. Another enterprise deserving of attention in Mexico is the projected construction connecting the Atlantic and Pacific by a new line. It is somewhat longer than the Tehuantepec line, but will cost less. It will profit by the Guatamala coffee trade, amounting to 50,000 tons per annum, and will reduce the time between New York and San Francisco to sixteen or seventeen days. This road is the precursor of other lines to build up a trade with Central America. Preliminary surveys have been taken and very inviting chances are said to exist for investment of capital, but it is in our own country that encouragement is to be found. A four hundred mile road is to be built next season from a point in Indiana on the Baltimore & Ohio road to Lake Huron. It will pass through a section of country now very sparsely supplied with railway facilities. The promoters are making inquiries for materials of all kinds, from ties up. Another road two hundred and twenty-five miles long is projected from Wisconsin to the Mississippi River. It will be completed on the other side at a little later day to Council Bluffs. Another road three hundred and seventy-five miles long will be completed from a point in Minnesota to Omaha.

Two foreign syndicates have subscribed some $17,000,000 to construct railways in Canada to create new outlets for the products of the Dominion. Another at St. Johns aiming at the development of some territory west of the Mississippi poorly provided with railway facilities. The road between Charlestown and Milwaukee is now being pushed to completion. It will develop rich coal territory between where it will cross the Ohio and Columbus. Some twenty or thirty roads are to be built throughout the interior of the country. A road 125 miles long in Florida. Instances of this kind could be multiplied to any length, but they serve to show that a new railroad era is opening despite all the talk about over-construction and decreased earnings. The fact of the matter is, that at no time has there been as much railroad enterprise shown as is now manifested. A great deal of money is to be put into bridge-building and into railroad and ship building, and into the extending of roads into new countries where traffic can be had. The Jersey Central is expending $250,000 upon its purchases. The New York & New England has improved its rolling-stock. The Pennsylvania Company is ordering 1,500 box-cars. The Central, of Georgia, has negotiated a $10,000,000 loan, and has just ordered two new steamers to ply between Savannah and Northern ports. The Louisville & Nashville has grand schemes in view looking to the development of new traffic resources in the South. An immense amount of railroad work is to be brought into the market during the fall and winter. During the past two weeks inquiries have been made for 100,000 tons of steel-rails. A large system has inquired for thirty thousand tons. The Gould system in the West will be in the market just as soon as some of its financial kinks can be untwisted. Several of the leading systems of the Southwest will be in the market for wheat and bagging cars. Competent authorities state that before the close of this year freight-cars will be ordered to the extent of 20,000 to 25,000. The reason for the placing of large orders is that iron and steel are at their lowest, and yellow-pine and oak also at their cheapest points. At least, railway managers feel that they will be running unnecessary risks if they postpone further placing of orders for next year's facilities. The feeling exists that confidence may be strengthened within the next three months, that the upward tendency of prices will be the result. The fact that we have done, so far this year, about ten per cent less business than last is one reason for anticipating that next year we will make that up. It is probable that we will do much more. The industries have been so compactly organized that over-production has been impossible, and, in fact, a good accumulation of stock is hard to find. Prices are held firmly everywhere. The lumber trade is in excellent condition. Prices are steady and demand strong. Profits are fair and speculations absent. Manufacturers express satisfaction with the year's results. Northern iron-makers continue their investments in the South. The Thomas Iron Company have just been building another furnace and rolling-mill that will employ 1,000 hands. The textile manufacturers are running along as though the world were crying for cotton goods. At this time 242,000 spindles and 4.800 looms are being added to the mills now in operation. At the end of the present year the South will have 1,736,000 spindles and 38,800 looms.

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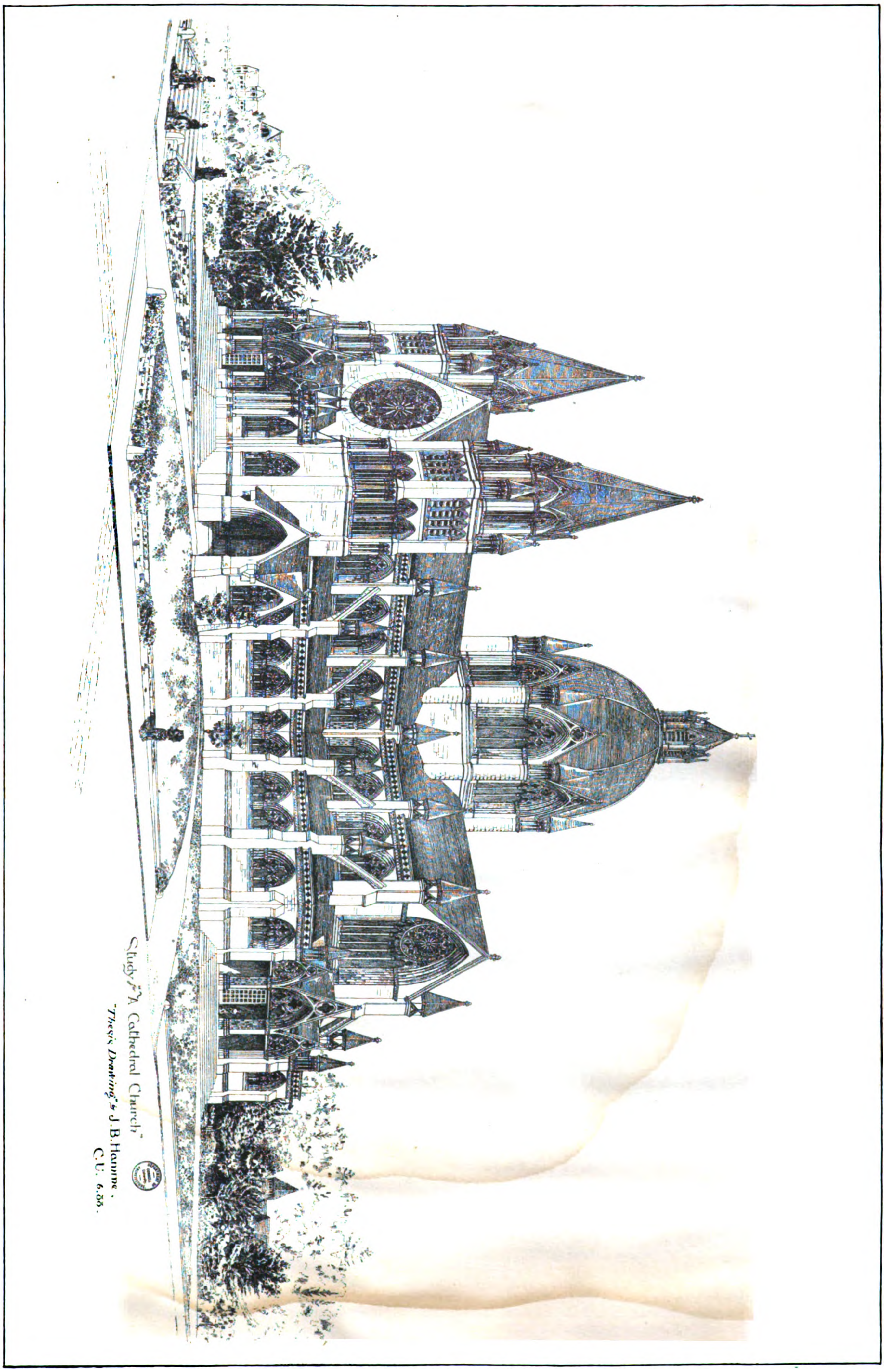

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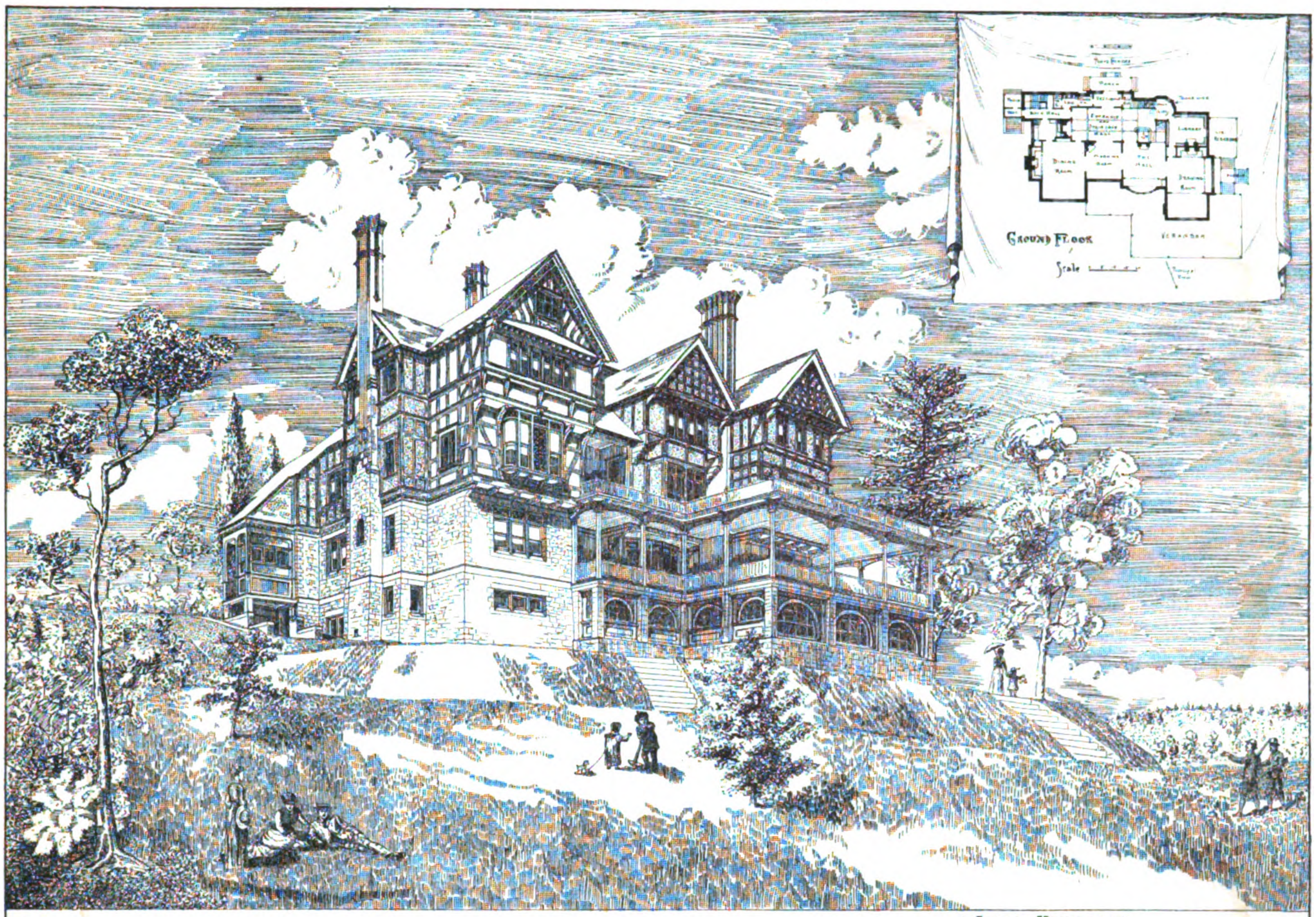
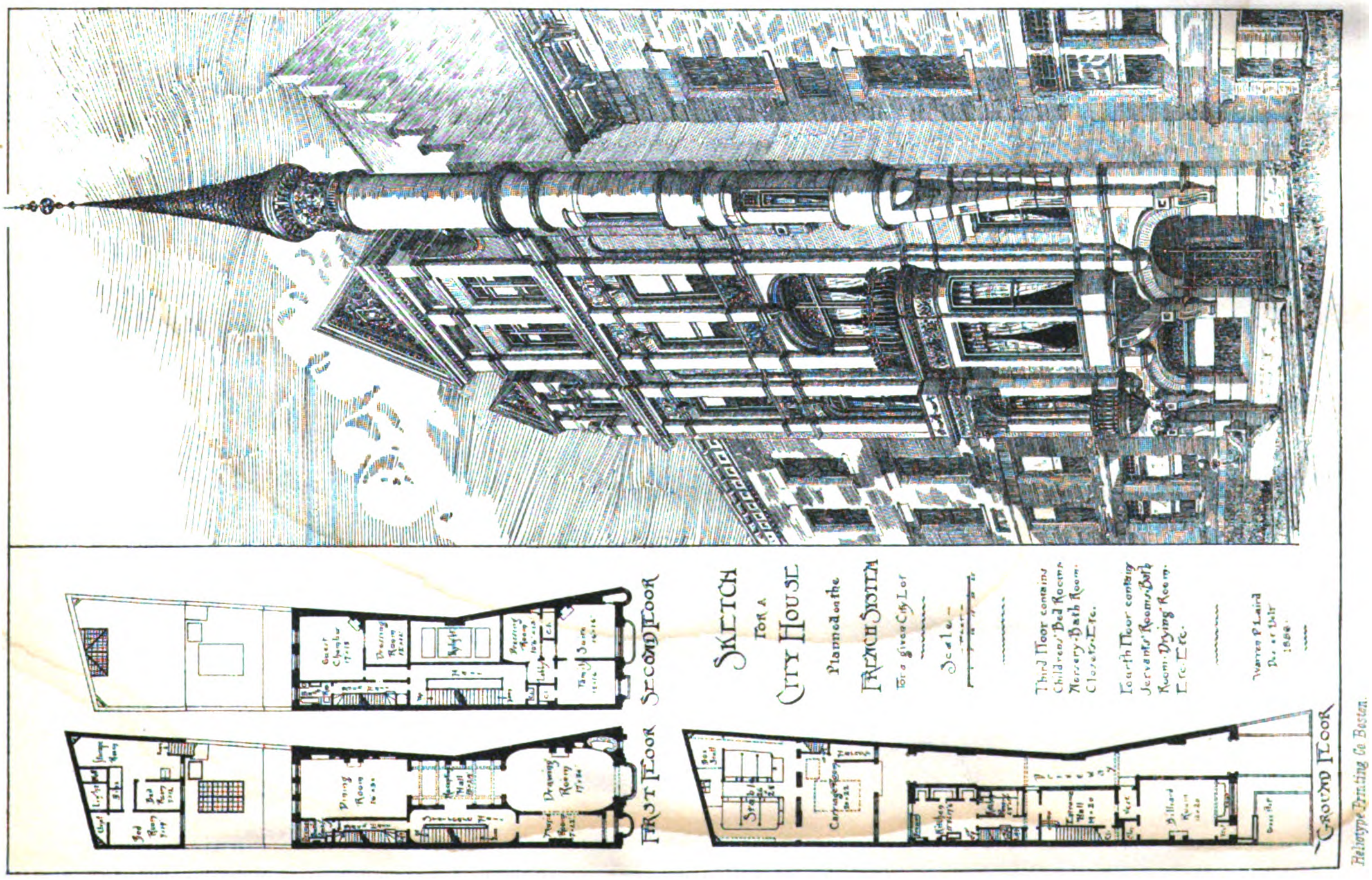


DESIGN FOR A SUMMER RESIDENCE FOR A LOCATION ON SOUTH HILL ITHACA N.Y. CORNELL UNIVERSITY Class in Junior Design Spring Term 1888. Warren P. Laird Des. et Del.



SKETCH FOR A CITY HOUSE Planned on the FRENCH SYSTEM For a given City Lot

Third Floor contains Children's Bed Rooms, Nursery, Bath Room, Closets Etc.

Fourth Floor contains Servants' Rooms, Bath Room, Drying Room, Etc. Etc.

Warren P. Laird Del. et Sculp. 1888.

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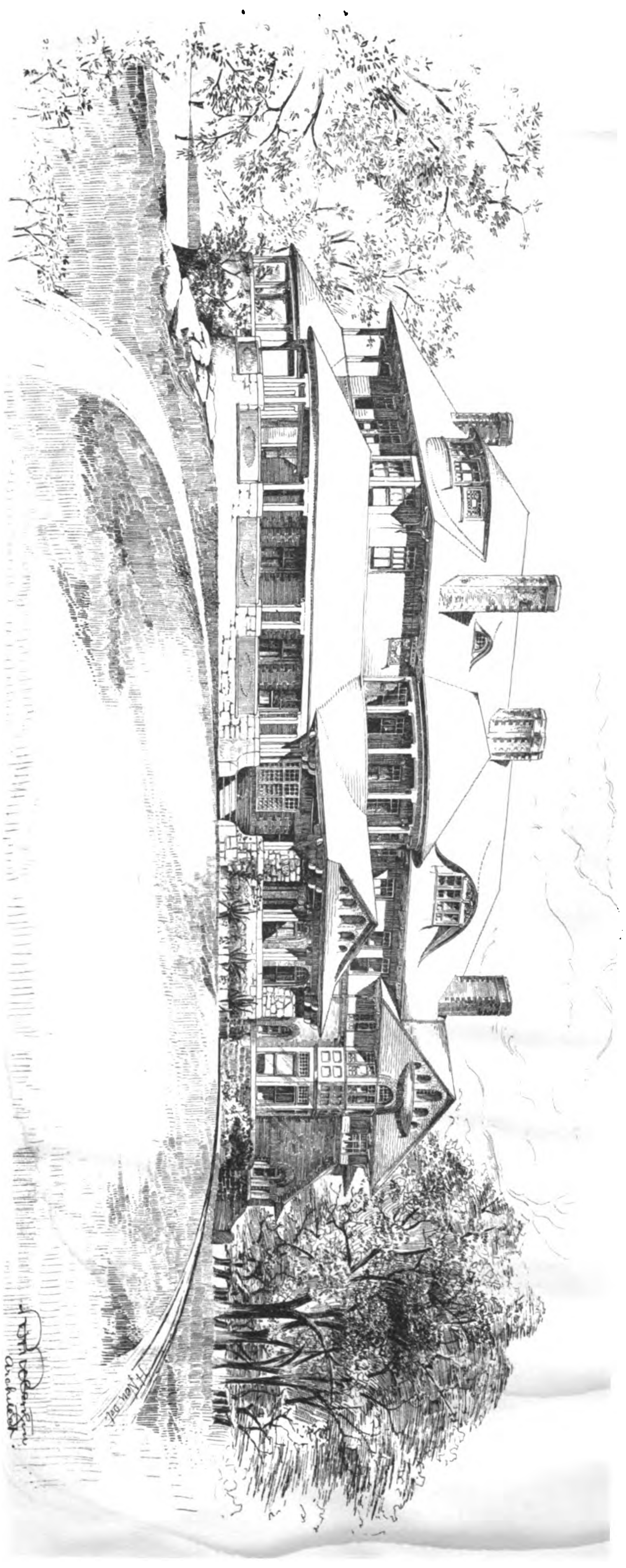

·DESIGN·FOR·A·COUNTRY·HOUSE·

R·H·ROBERTSON·ARCH'T·

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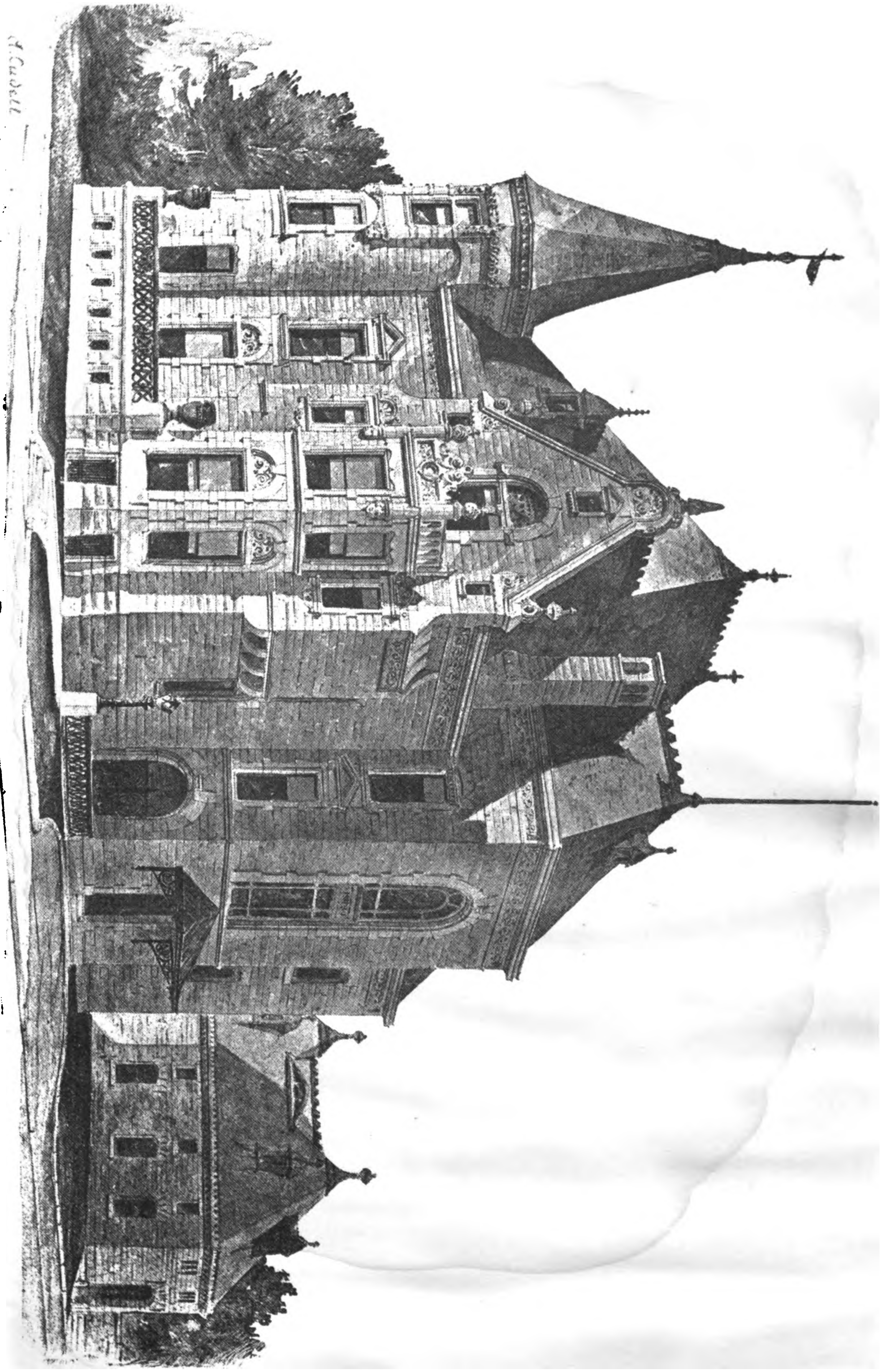

HOUSE OF CONRAD SEIPP, ESQ. CHICAGO, ILL.
A. CUDELL ARCHT.

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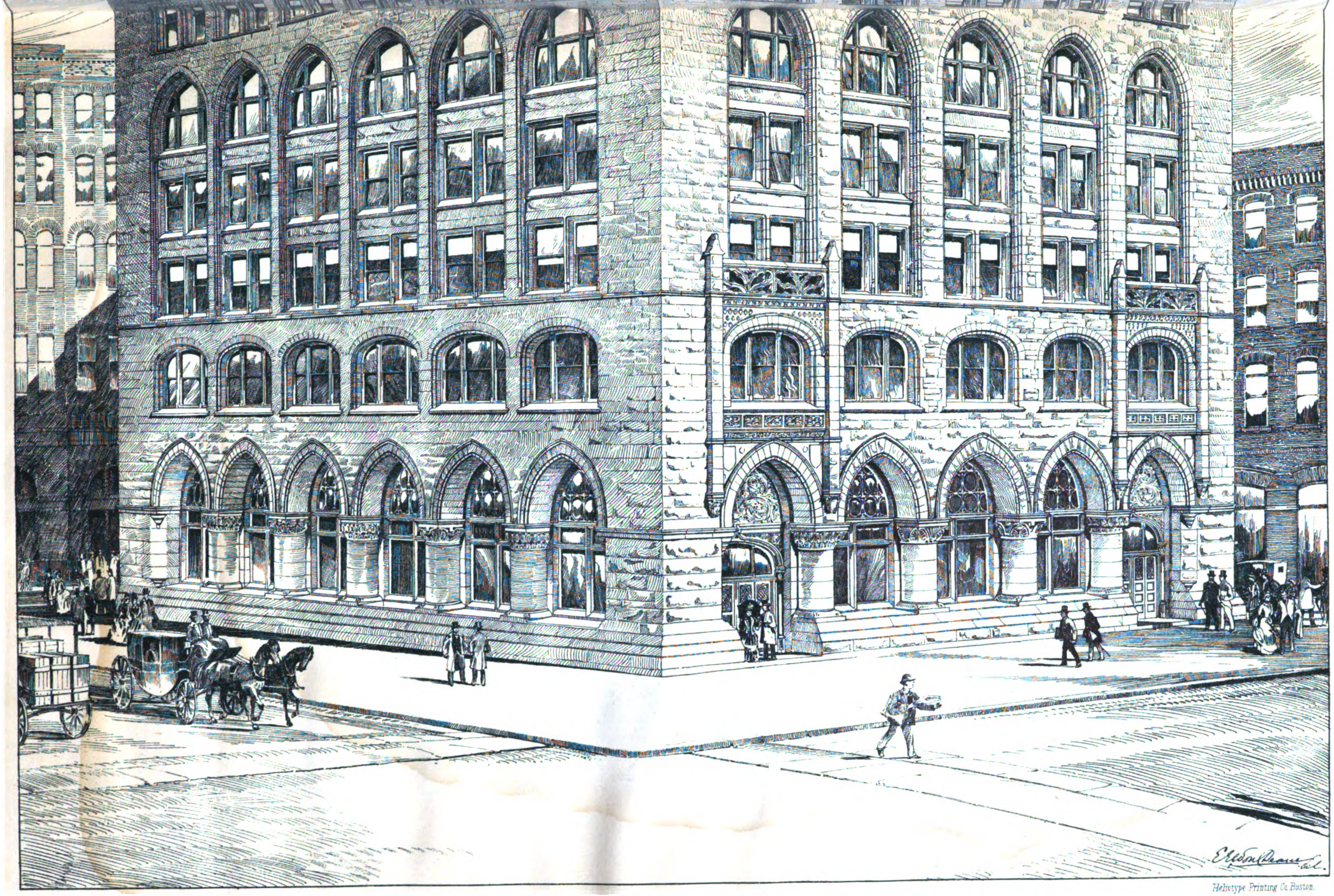

Helotype Printing Co. Boston.

BUILDING OF THE SOCIETY FOR SAVINGS. CLEVELAND, O.

BURNHAM & ROOT, ARCHITS

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The exterior of this house is stained with
CABOT'S CREOSOTE STAIN
for Shingles, Fences, Clapboards Etc.

Mr. W. R. Emerson desires us to publish the fact that he is using our stains continually, and that he has never pronounced them inferior to any other in the market.

These Stains are very durable and give a much more artistic effect than paint, while they are cheaper, and very easy to apply:

Our Stains contain no water and are the only exterior Stains that do not contain kerosene:

PRICES ARE 30, 50, AND 75 CENTS PER GALLON ACCORDING TO COLOR
SEND FOR SAMPLES ON WOOD, AND CIRCULARS

J.C.H

SAMUEL CABOT,
70 KILBY ST. BOSTON MASS.

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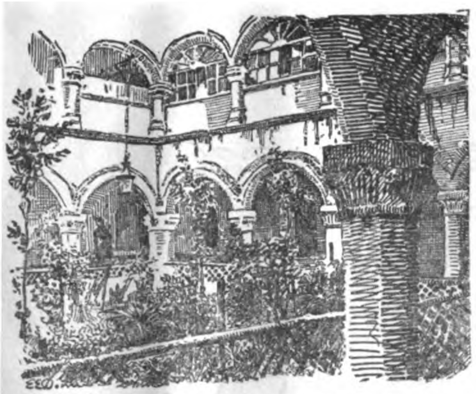
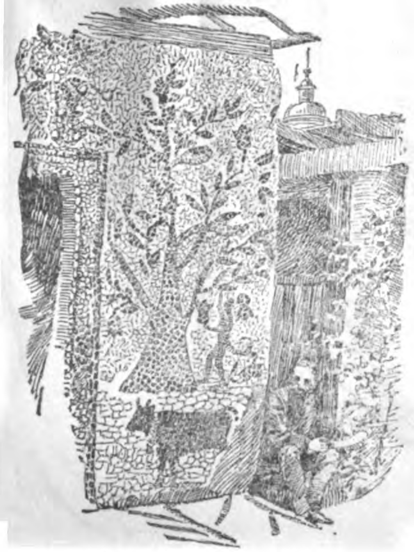


Cloister and Chapel at Amecameca, Mexico.

Mexican Ox-Cart.

Guadalupe, Mexico.

Mexican Laundry.



Pottery Mosaic at Guadalupe.

Vera Cruz.

Unfinished Chapel, Hemosillo. Sonora, Mexico.

MEXICAN SKETCHES.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIV. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 668.

OCTOBER 13, 1888.

Entered at the Post-Office at Boston as second-class matter.

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THE Convention of the American Library Association, which was held this year in the Catskill Mountain region, amused itself, as usual, by falling foul of the architects, over whose prostrate forms every scientific hobby is made to prance. Beginning with the maxim laid down by the president of the Association, that "the architect is the natural enemy of the librarian," the audience approved the plan of the rooms for the library in the Albany State-house, prepared by a librarian, and then proceeded to "riddle" the plans for the Howard Library at New Orleans, prepared by the late H. H. Richardson. Not content with this, the Convention went on to "riddle" Richardson's library designs in general, declaring that they afford "little indication" that he ever "gave any thought to the object for which his buildings of this sort were intended," and that he "appears to have been satisfied if he drew a beautiful design, and to have left it to some draughtsman to fit in the books and the service;" and concluded by inquiring earnestly for "an artist who will plan for use first and beauty next, who will see where his book-shelves and his reading-halls and his work-rooms ought to go for the highest efficiency, and will then mould his library building around them." Considering that no two librarians appear to be agreed as to "where book-shelves and reading-halls and work-rooms ought to go for the highest efficiency," and that any plan advocated by one is generally laughed to scorn by the rest, it is not surprising that architects have not yet invented an arrangement which suits everybody, and that if they succeed in drawing a "beautiful design," which gives the accommodation that the owners want, and holds the requisite number of books in a convenient and accessible disposition, they are apt to be content, without troubling themselves whether all librarians would unite in a concert of praise over their work. In point of fact, Richardson, although he liked to draw "beautiful designs" for libraries, and generally succeeded in doing so, was very far from careless as to the object to which his building was to be put. As in all his work, the requirements of the case, so far as he could understand them, dictated the plan, and this suggested the rest, and to improve the arrangement he was never tired of studying methods of lighting, heights and widths of shelves, ease of access to the several portions, quiet for the reading-rooms, and space for the movement of the public. Although the librarians may find in his work no indication that he had studied these points to any effect, we will answer for it that other people do, and there are few persons, not librarians, who do not find an attraction in Richardson's comfortable, cosy reading-rooms, with their open fireplaces and separate tables, which the table-d'hôte arrangement of ordinary libraries, however well adapted it may be for celerity of movement behind the chairs of the readers and for slamming piles of books suddenly between them, fails to present. Nor, although we speak modestly of the arrangement of book-shelves, as a matter about which we profess little knowledge, does the Richardsonian plan of successive alcoves, with no shelves beyond reach from the floor, each brightly lighted by a window, and all communicating by convenient doors through the shelving, seem utterly bad in comparison with that adopted in libraries which have not been molested by architects. Not long ago we had occasion to look for a book in a rather famous library. We were directed to a certain room and set off in search. The way to the place indicated was up a narrow spiral stair. This ended in a small alcove, encumbered with a table, a chair and some portable steps. Thence, the path led along a balcony, some eighteen inches wide, overhanging the reading-room below, and guarded by a railing about the height of one's knees. At intervals the way was obstructed by furniture, which had to be hoisted up and deposited behind one to allow a passage, and the balcony ended in another spiral stair, which led to a room filled with book-shelves in stacks, with only room enough to pass between them. After examining all the stacks, we came to one which seemed to contain books relating to the subject in which we were interested, and the next operation was to find the one we wanted. There was a window, or a skylight, somewhere in the room, but only a few rays of light struggled so far as our stack. We could read the names of the books on one or two shelves, but there were other shelves above filled with books, the titles of which were invisible, while the books themselves, even if the names could have been read, were out of reach, except from steps, of which there were apparently none nearer than the balcony. We suppose that there was some virtue in the arrangement, as the "librarian's enemy" certainly had had nothing to do with it, but as compared with the roomy, light, accessible shelving provided by Richardson and many other architects, the collection, to the layman's mind, was clumsily and awkwardly accommodated.

OWING to the smallness and inconvenience of the buildings, and the value of the site for business purposes, the Custom-house and Sub-Treasury, on Wall Street, in New York, are to be sold, and more spacious buildings erected in some other place. What that place shall be is not yet decided. Mr. William F. Fryer, the skilful and experienced Superintendent of Repairs of the United States public buildings in New York, has made a report on the subject, in which he recommends that land should be taken either in the Bowling Green, or on Battery Park, but he prefers the Bowling Green. The *Engineering and Building Record* seems to think that Mr. Fryer proposes to appropriate the open space of the Bowling Green for buildings, which we trust is a mistake. It is hardly credible that the City of New York could convey, or the United States acquire, the right to erect an enormous building in the middle of the modest expansion of Broadway which goes by the name of the Bowling Green, and the obliteration by the Government of this little breathing-space, to save the cost of such land as private individuals would have to buy, would certainly cap the climax of the wanton meanness with which our Government sees fit to conduct public works. The other site proposed — that bounded southerly by the Battery Park, and westerly by West Street, with the open expanse of the Hudson River beyond, and extending easterly to Greenwich Street, closing up Washington Street from Morris Street southward, is in most respects finer than the other. Overlooking, as it does, the whole expanse of the bay, the new building would form an architectural termination to the city which is greatly needed. Until within a few years, the traveller approaching New York by sea was greeted by a shabby common, occupying the headland, in the midst of which stood the huge, but dilapidated shed of Castle Garden; the great business buildings of the city showing their blank party-walls through the smoke, a half mile or so away. Since the extension of the elevated railways the grass of the Battery Park has been kept in better order, but the black trestles of the railroad have made the whole effect worse than ever, and the great Field Building beyond them is rather too tall, and minute in detail, to be imposing. With, however, an immense Government building next door, the Field Building would show to advantage as a part of a very

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noble group, facing the sea, and the building up of State Street with handsome structures would probably follow soon. Although the Battery, on account of the shallowness of the water south of it, does not furnish available wharfage, it is all the better suited on that account for the offices of persons interested in shipping, as it commands an unobstructed view of every vessel that enters or leaves the port of New York. We suppose that the merchant-venturers of Amsterdam, who took pleasure in having their vessels from Batavia or Guiana moored and unloading in the canal in front of their parlor windows, or the Genoese princes, whose palaces overlooked every movement in the harbor, would be considered old-fashioned in these days; but if American commerce should ever revive, there would probably be many persons who would be glad of an opportunity to watch it from so advantageous a situation as the streets around the Battery.

THE State Capitol at Austin, Texas, has proved unsatisfactory to the Board having its construction in charge, and it has been unanimously voted not to accept it or pay for it. It seems that the designer of the building, Mr. Myers, of Detroit, was not employed to supervise its execution, and some curious changes are said to have been made, with the consent of the State officials, from what the specifications required. The dome, for example, which was intended to be built of cast-iron, and was so shown in the drawings and specifications, and contracted for in accordance with them, is reported to have been made of galvanized-iron, at a profit to the contractor of forty or fifty thousand dollars; while the drainage system, which would have cost about fifteen thousand dollars, was entirely omitted. The question will occur to a good many people, whether it would not have been cheaper to pay the architect twenty or thirty thousand dollars for supervision than to let the contractor escape with sixty or seventy thousand that he had not earned, leaving the building with a dome which will surely go to pieces in a few years, but this question is as yet of less interest than the inquiry whether the State will have to pay the full price for what it has not got. Although the reports of the case are very meagre, we are by no means sure that it will not be compelled to do so. If the Capitol Board which now refuses to accept the building is the same as that which controlled its construction, it is very poorly equipped to resist the contractor's claim. Certainly, if it allowed variations from the specifications to be made, it will find it difficult to refuse to accept the building because its directions were followed; and the Board can hardly excuse itself for such errors on the ground of ignorance of the subject, after the expression, which is credited to the Governor, that he "he knew more about building than any four architects." The fact seems to be that the contractor found himself under the orders, not of an architect, but of a group of laymen, and played upon their ignorance, as many contractors know how to do, wheedling them into consenting to changes in his work, and managing the construction with enough show of zeal to deceive the amateur superintendents as to what was really going on. On the completion of the building, the Board withholds the money agreed upon as its price, on general principles, and searches about for excuses for doing so. Of course, its eyes being opened by some expert, it finds plenty, but it is embarrassed, apparently, by the fact that the defects in the building are mainly the result of its own orders. This, of course, makes no difference to the Board, but, if the case should come to trial, it will make a good deal of difference to the contractor; and we shall not be very sorry to have the battle fought out, for the sake of showing, if nothing else, how clumsily and wastefully boards of laymen conduct building operations.

THE manufacturers of plumbers' soil-pipe, who are rather prone to get into quarrels with the plumbers, are in hot-water again, about the testing of the goods they furnish. One of the regulations of the New York Board of Health requires that all soil-pipe used by plumbers shall be capable of resisting a pressure of five pounds to the square inch without leaking. Quite recently, rigid inspections of soil-pipes have been made to determine their quality in this point, and a very large number have been condemned. Naturally, the plumbers, who had bought the pipe for a high price, were indignant at finding about one-fifth of it condemned as worthless, and brought the matter before the Plumbers' Association, which officially requested the manufacturers to test the pipe before delivery. This the associated manufacturers refused to do, and the plumbers have now advertised in the newspapers that they wish to find some maker of iron pipe who will test the goods before delivery, and, if such a manufacturer is found, they promise to buy of him hereafter. For the interest of the public, we hope that this movement of the Plumbers' Association will succeed. The manufacture of plumbers' cast-iron pipe, as now carried on, is disgraceful to those who control it. There is certainly no more difficulty in casting double-thick soil-pipe, which the New York law now requires to be used everywhere, as evenly, and with as few flaws, as water-pipe, and if the manufacturers can afford to test water-pipe for imperfections, they can just as well afford to test plumbers' pipe, which is sold for a much higher price. The requirement of strength to resist five pounds per square inch is absurdly small. Such pipe ought to be tested, after putting into the house, at thirty to forty pounds to the square inch, and each piece should have a hydrostatic test of at least one hundred pounds before being allowed to leave the foundry. Nothing short of this will secure safety from the leakage into houses of sewer-gas, which is now proved to carry scarlet fever and diphtheria infection, as well as the germs of other diseases; and if this cannot be had with cast-iron pipe, the sooner the use of such pipe is forbidden the better. Already wrought-iron pipe has to a great extent superseded that of cast-iron for plumbers' use, and a general public announcement that the makers of cast pipe had resolved not to take the trouble to have it strong enough to resist a pressure equal to that exerted by a man blowing into it would soon close the market permanently against it.

WE publish elsewhere with much pleasure the circular of the Architectural League of New York, calling attention to the second annual competition for the gold and silver medals of the League, open to all residents of the United States, under the age of twenty-five, who may desire to try their strength in design and drawing. The subject for the present year is an admirable one. Nothing could be better calculated to test the real artistic capacity of the competitors, independent of the effective tricks learned in offices, and we have faith enough in American talent to believe that the exhibition of the competitive sketches will be well worth seeing.

MANY persons have seen something of Etruscan monuments or sculpture, and probably know that until within a few years the inscriptions accompanying the sculpture had never been deciphered. Although the cuneiform writing of Mesopotamia, consisting of characters entirely different from those of any known language, was soon understood, there seemed to be no key to that of the Etruscans. Very recently, however, a key has been found, strangely enough, in a modern language, or at least, one which is still spoken by six hundred thousand people; and not only has this well-known language of the Basque province of Spain served to interpret the writing of a people which was ancient before the wolf nursed Romulus and Remus on the Capitoline hill, but the relationship seems plainly to connect the modern Basques with the Pelasgi, those strange wanderers whose settlements extended from the Euphrates to the Atlantic. Singularly enough, the Basques have no ancient inscriptions or manuscripts, their language having been written only for three or four centuries, so that the allied portions of the Etruscan inscriptions are selected by comparison with words which have been preserved by oral transmission only for at least three thousand years.

A CORRESPONDENT of the *Builder* describes an analysis of two samples of mortar, one from a wall about two hundred years old and the other from a neighboring wall of about one-half that age. The mortar in the latter was very hard, while that of the other was soft, earthy and easily crumbled in the hand. On analysis, the two mortars showed almost precisely the same composition, the harder specimen having a little more lime and somewhat more silicate of lime, as if a chemical action had taken place between the lime and sand in one case, but not in the other. A microscopic examination showed, however, that the sand in the good mortar was in the form of angular grains, while in the other the particles were rounded, as if they had been taken from the seashore or the bed of a river.

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BUILDERS' HARDWARE.[1] — VIII.

BUTTS.

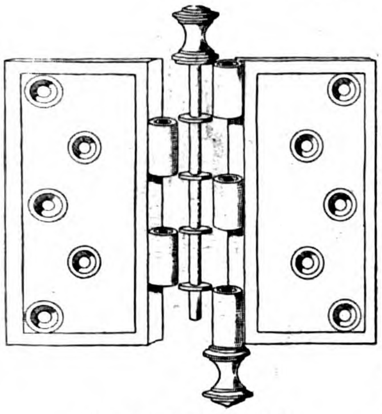

Fig. 85. Loose-pin Butt.

AS previously stated, a butt is properly a hinge which is screwed onto the butt edge of a door. The arrangement of the parts of a butt is governed somewhat by the direction in which the door is to swing, and in order to distinguish properly doors, and consequently the corresponding butts, they are designated as being right or left hand. This distinction is not always clear even to those who are somewhat familiar with the subject of builders' hardware; but a very simple way to remember which is right and which left, is to bear in mind that when a door, in opening, turns on its hinges in the same direction as is followed by the hands of a clock, it is a right-hand door, and contrarywise a left-hand door. In other words, the distinction is the same as is made in physics between positive or right-hand, and negative or left-hand deflections.

All of the commonest forms of butts are so made that the two leaves cannot be separated, the pin being riveted in place. This constitutes a fast-pin butt. Nearly all of the strap-hinges previously described are fast-pin. Such a form is not available for nice work, as it does not permit the door to be removed without unscrewing the hinge. The better class of butts are, accordingly, made with a loose pin, Figure 85, which can be readily withdrawn if the door is to be unhinged. A fast-pin butt would have exactly the same appearance as this when put together. Figure 86 is a third variety, known as a loose-joint butt. In this the pin is cast or attached solidly to the lower hub, working in the hollow hub of the other leaf, as shown by the dotted lines of the figure. This form permits the door to be removed with the greatest ease, it being simply swung clear of the casing and lifted bodily off of the hinge-pin. This style of butt is usually preferred in New England, though elsewhere the loose-pin butt is more generally employed.

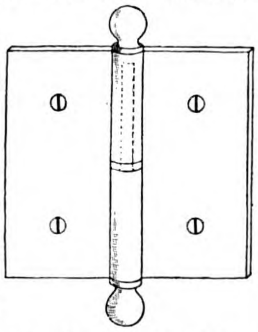

Fig. 86. Loose-joint Butt.

The obvious advantage of the loose-pin butt is, that the amount of bearing-surface is increased to a maximum, and as the pin is distinct from the leaves of the hinge, it can be made of a metal which will stand more wear than the ordinary bronze or iron of the butts. The loose-pin butt illustrated has eight bearing-surfaces. There are never less than four, but, even then the butt has a considerable advantage over the form shown by Figure 86. On the other hand, the loose-joint butt is more readily attached to the door and unhinged, and it costs less, though the difference in the latter respect is but slight. The difference in the amount of bearing is, in a measure, lessened in the best makes of loose-joint butts by accurately adjusting the length of the pin so that it will bear at its upper end against the top of the socket, which is usually closed by the false tip. Figure 87 shows an improved form of loose-pin butt made by the Yale & Towne Manufacturing Company, in which the pin and all the bearing-surfaces are of steel.

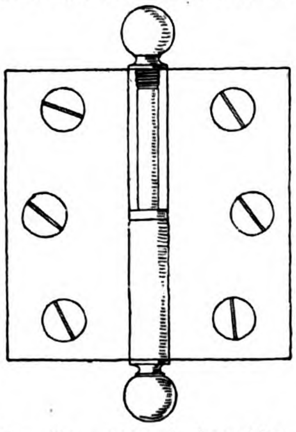

Fig. 87. Improved Loose-joint Butt. Yale & Towne Manufg. Co.

It will be readily understood that, even with the most multiple form of loose-pin butt, the bearing-surfaces would soon give out if not reinforced with some more durable material than bronze. Accordingly, in all but the cheapest kinds of goods, the bearing-surfaces are fitted with some form of steel washer. In loose-joint butts the washers are exposed, as shown by the figures, and, besides taking up the wear, are useful in adjusting the butts to the doors, as two or three washers may be used on a butt if necessary, though, of course, a first rate mechanic would fit the butts properly without any washers. Loose-pin butts may have washers in the same manner, but the more general custom is for the joints to be bushed, or provided with washers which are countersunk in the hubs of the butt, so as not to appear externally. The Yale & Towne Manufacturing Company has a device by which the bushings are imbedded in plumbago, enabling the joints to lubricate themselves by their own motion. A pair of hinges so prepared has been attached to a motor, and turned back and forth a number of times equivalent to the use of over thirty years, without showing any signs of wear.

Butts are made of a variety of metals, the commonest grades being of malleable-iron. The next grade is of wrought-iron or wrought-steel. Iron and steel butts are left either with a plain bright finish, japanned, bronze-faced, Bower-Barffed, or nickel-plated. For nicer work butts are made of brass, bronze, or silver. All of these styles of finish are in the market, and the different manufacturers so closely agree in their goods that it would be impossible to make any comparison. There are great varieties in finish and design of the portions of the butts which show, and of the tips of the pins. Some of these will be considered in a subsequent chapter.

The best butts for common or cheap work are made of wrought-steel. The following table is compiled from the catalogue of the Stanley Works, which is about the largest manufactory of goods of this description. The figures given are the average retail prices in Boston:

TABLE OF WROUGHT–STEEL LOOSE–JOINT BUTTS.

Screw holes in each Butt.	Size of Screw.	Size open.	Steeple-tips, washers, Bronzed polished. Price per doz. pairs.	No tips, No washers,[2] Common finish. Price per doz. pairs.
4	No. 8	2 x 2	$3.94	$1.36
4	8	2 x 2½	4.07	1.44
6	9	2½ x 2	4.54	1.72
6	9	2½ x 2½	4.80	1.84
6	10	3 x 2½	5.18	2.00
6	10	3 x 3	5.55	2.16
6	10	3 x 3½	5.81	2.32
6	11	3½ x 3	6.41	2.50
6	11	3½ x 3½	7.12	2.68
6	11	3½ x 4	7.84	—
8	11	4 x 4	8.17	3.38
8	12	4 x 4½	8.55	3.44
8	12	4½ x 4½	9.49	4.08
8	12	4½ x 5	10.05	4.32
8	13	5 x 5	11.59	5.28
8	13	5 x 6	12.48	5.76
8	13	5½ x 5½	13.50	—
8	13	6 x 6	14.62	6.72

The finer grades of butts include such as are used for nice interior work. The pin is sometimes made of the same metal as the butt, but is better made of steel, rigidly inserted in the lower hub. Butts were formerly finished by hand almost entirely, but some most interesting machinery has been devised for centring, drilling, turning and finishing the work with almost mathematical precision.

The following table gives the average retail prices of the butts manufactured by some of the principal firms in the country. The goods referred to are perfectly plain, with simple ball-tips. Figured patterns are apt to be somewhat cheaper, though the designs vary too greatly to admit of any fair comparison. The prices are for two butts with the necessary screws. All of Robinson's goods are hand-made. The others are machine-made. All of the butts are supposed to be steel-bushed or have steel washers.

[1] Continued from No. 665, page 133.

[2] For washers add from 35 to 50 cents per dozen pairs of butts.

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TABLE OF LOOSE-JOINT, BALL-TIP BUTTS.

Sizes open.	Bronzed Steel, Fine Polished. Stanley Works.	Bronze, Brass or Nickel. P. & F. Corbin.	Bronze or Bower-Barff Iron. Yale & Towne Mfg. Co.	Bronze. Chicago Hardware Co.	Bronze. A. G. Newman.	Bronze. Enoch Robinson.
3 x 3	$ .70	$ .95	$1.00	$1.00	——	——
3½ x 3½	.90	1.12	1.25	——	——	——
4 x 4	1.00	1.42	1.50	1.35	$2.00	$2.50
4½ x 4½	1.30	1.70	1.75	1.75	2.25	3.00
5 x 5	1.50	1.92	2.00	2.00	4.00	3.50
5½ x 5½	1.75	2.42	2.50	2.25	5.00	4.50
6 x 6	2.00	3.00	2.75	2.75	6.00	5.00

Butts are also made in irregular sizes, that is to say, of such dimensions that when opened out flat they will not be exactly square. The forms more commonly employed, however, are the square sizes, as given above. Larger sizes than 6 x 6 are seldom used, as it is found better to increase the number of butts, rather than the size. The Robinson butts listed are so made that the ball-tip can be unscrewed, to permit of greater ease in oiling the bearings, and the pin is made to bear on its point against the head of the socket.

The Yale & Towne butts here listed are of the ordinary loose-joint pattern. The special makes are sold as follows, the prices referring to a plain, ball-tip butt, in either bronze or Bower-Barffed iron:

TABLE OF YALE & TOWNE BUTTS — SPECIAL PATTERNS. PRICES PER PAIR.

	3 x 3	3½ x 3½	4 x 4	4½ x 4½	5 x 5	5½ x 5½	6 x 6	6 x 8
	$	$	$	$	$	$	$	$
Loose-joint, steel bearings, as per Figure 87.	1.75	2.00	2.50	2.75	3.25	3.50	4.00	6.50
Loose-pin, extra heavy, five steel bearings, self-lubricating washers..........................	2.00	2.50	3.00	3.25	3.75	4.25	4.75	7.50

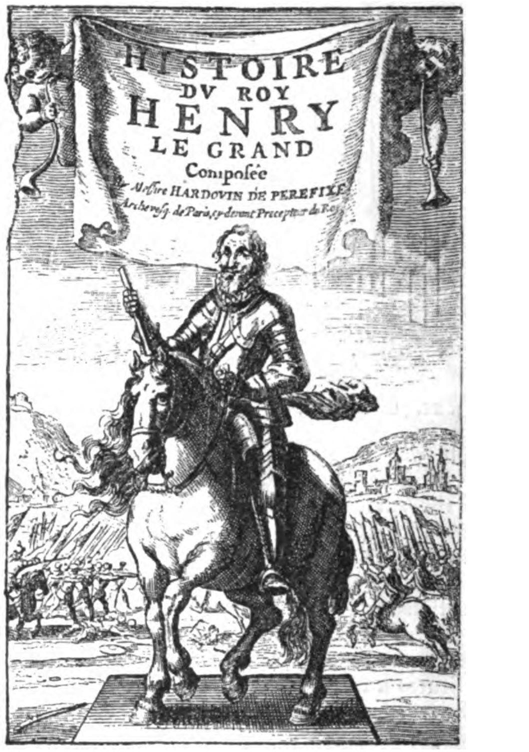
Too much care cannot be given to the selection of the butts or hinges which are to be used in the interior of a dwelling-house, for there is hardly any hardware about a building which is subjected to such constant and extreme wear as the door-hinge. Nor is there any department of house-trimmings in which so many poor grades of goods have been introduced, always excepting, however, locks. Even the best manufacturers have been forced to meet the competition in cheap goods, and often two butts will be sold by the same house, of which one will be poor and the other first-class, though, to a superficial inspection, they present exactly the same appearance. The whole secret, aside from mere questions of design and external finish, lies in the nicety of adjustment of the bearing-joints; and as the only sure test is that of actual wear, a poor butt looking as well when new as a good one, the wisest plan for the architect is to select his butts entirely from samples. A reference to a catalogue is not sufficient to ensure the proper quality of goods, unless one possesses an acquaintance with the hieroglyphics of the trade — which few architects ever acquire. To be sure, many clients want cheap goods, and some would prefer periodical visits with an oil-can to all the squeaky hinges in a house, rather than to pay the extra price for such articles as the Yale & Towne self-lubricating butts. Still, the obligation is no less on the architect to acquaint himself with the best of everything, as well as to know how to get it.

[To be continued.]

Aluminium Alloys. — Interesting experiments were made this week at the Brins Laboratory, at Lambeth, with aluminium and steel. A quantity of broken cast-iron, smeared with clay and a special flux, was transformed in the furnace into excellent steel, containing two per cent of aluminium. Under the influence of the flux the iron combines with the aluminium in a nascent state. The metal thus treated is highly sonorous and susceptible of a high polish. — *New York Evening Post.*

EQUESTRIAN MONUMENTS. — VII.[1]

PERISHED MONUMENTS. — THE FRENCH REVOLUTION.



An Elzeverian Frontispiece.

Petit Cheval, joli cheval,
Doux au montoir, doux au descendre,
Bien plus petit que Bucephel,
Tu porte un plus grand qu' Alexandre.[2]

IT is not to be supposed that if an equestrian monument were erected to Phillipe le Bel similar memorials should not be created in honor of succeeding French monarchs, and in the reliefs of Louis XII over the entrances to the Château de Blois and the Hôtel-de-Ville at Compègne we have halting-places between the thirteenth and the seventeenth century.

The unstable Gallic nature knows no middle ground in the matter of likes and dislikes; its hero of the moment is a demi-god or even greater, and the enthusiasm with which Frenchmen of the time (1589–1610) regarded Henry of Navarre, the Bernese hero, knew no bounds, and so long as it existed the statue of Henry IV, placed on an abutment built out on the west side of the Pont Neuf at Paris, was an object of special regard.[3] This place was selected for the statue because the bridge was built by the order of the king himself.

Concerning the statue itself there are many traditions, each varying from the rest in some particular, but all agreeing that its career was uncommonly varied and romantic. According to what seems to be the best supported tale, it was determined about 1604 to erect an equestrian monument of the king, and a Flemish sculptor, Francavilla by name, prepared a sketch in wood, but seems not to have been considered a man of force enough to carry it out, and it was accordingly decided that the work should be carried out in Italy by Giovanni da Bologna, whose fame as the sculptor of the equestrian statues of Cosmo and Ferdinand de' Medici was well known to Marie, the wife of Henry. It is possible that the decision may have turned on the fact — if fact it be — that Giovanni had at that time on his hands the unfinished model of a horse for an equestrian statue of himself which had been ordered by the Grand Duke Ferdinand, but was not completed because of his death, and his successor, Cosmo II, instead of going on with the work, presented it to his cousin Marie. Be this as it may, Giovanni da Bologna was selected for the work in spite of his eighty years, and for a time he turned his attention to so transmuting his idea of an Italian prince that it should answer for a French monarch; but the little work he was able to do before his death was mainly bestowed upon the horse, which was essentially his. At his death the work fell to the care of his pupils, Pietro Tacca and Pietro Francavilla, who did not finish the statue for some years after Henry's assassination by Ravaillac in 1610. Completed at length in 1613, this statue[4] was embarked at Leghorn, but suffered shipwreck off the coast of Sardinia, and was supposed to be a total loss. It was, however, recovered, placed in another ship and proceeded on its interrupted voyage to Le Havre, where it was transferred to a flat-boat and towed up the Seine, reaching the Pont Neuf, July 24, 1614.

[1] Continued from page 145, No. 666.
[2] Improvised by Theophile on seeing the model of the statue of Henri IV.
[3] After the death of the Grand Dauphin, the people used to leave their petitions at the feet of the statue on the Pont Neuf.
[4] Man and horse measured about 5.70 m., and the total weight was 12,416 French pounds. The slaves about the pedestal were larger than nature.

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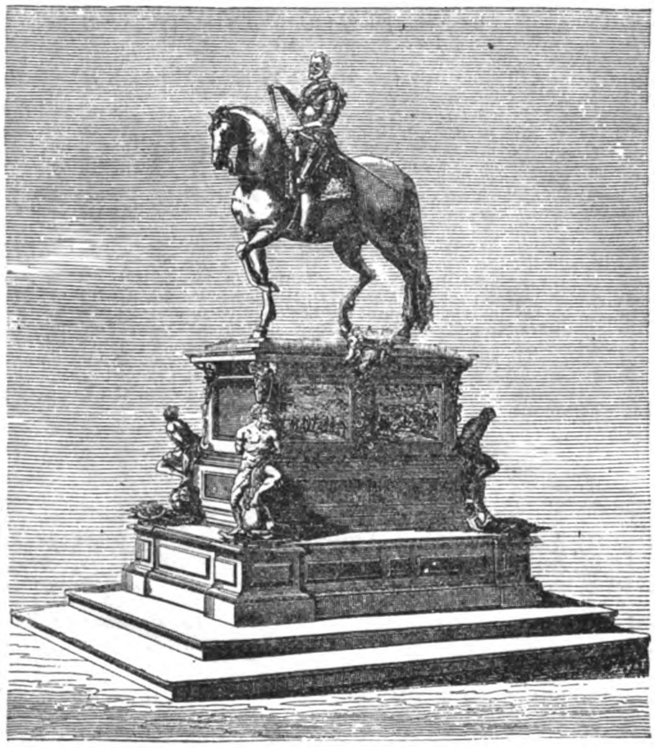
Up to this point the different accounts which have been substantially in accord begin to differ: some say that the horse alone arrived from Italy and was at this time set up with great rejoicing and that the figure of the king was not placed upon its back until 1635, and was, consequently, modelled not by Tacca or Francavilla, but by Dupré. The best support for this story seems to lie in the fact that the statue was commonly called "*Le cheval de bronze*," as it was little likely to have been if at first the king's figure had surmounted it, unless the merits of the horse far outshone the artistic portraiture of the king. On the other hand, the Queen Regent would hardly have written to Tacca, after seeing the statue, that it was "in all verity worthy of the man it represents" if horse and man had not been forwarded from Italy; and an analysis of fragments of the horse and rider now in the Louvre show that the composition of the metal



The Original Statue of Henry IV, on the Pont Neuf, Paris.[1]

was identical in both parts. But there evidently was some great delay in finishing the statue — perhaps it was merely in the matter of adding the bas-reliefs and the figures of the four chained slaves about the pedestal, finished by Bordoni, the son-in-law of Luigi Civoli, who designed them — for the populace considered that their idol was not properly treated, and, by some freak of unreason, laid the blame at the door of the Italian Concino Concini, Marshal d'Ancre, the intriguing favorite of Marie de' Medici, and practically the prime minister of the kingdom. Popular detestation of this man was such that when, owing to the influence which the Chevalier de Luynes had over the young king, Louis XIII, his arrest was made by the king's order as he was entering the Louvre, and he was incontinently shot on the spot, the people exhumed his body after burial and dragged it through the mire to the Pont Neuf, and there before the statue of Henry IV tore it to pieces and burned the fragments, one savage tearing out his heart, half roasting and then swallowing it. The unfortunate man's wife, the former maid and confidante of Marie de' Medici, was afterward accused of witchcraft, beheaded and her body burned.

At a later time, too, the people showed in their peculiar way their respect for the good king, as when, during the year 1789, they dragged aristocrats from their carriages as they passed over the bridge and made them uncover and bend the knee before the statue. Even Philippe Egalité, Duke of Orleans, who voted as a member of the Convention for the death of his cousin, Louis XVI, was forced to make his obeisance in this way. The same feeling of veneration favored the statue through one short summer day, for during this short space the people hesitated whether to include this statue also in the destruction decreed against all the statues of former rulers, a decree which had resulted on August 11, 1792, in the overthrow, amongst others, of equestrian monuments of Louis XIII, Louis XIV and Louis XV. On August 12th, the crowd gathered on the Pont Neuf again and looked and once more hesitated, but finally the leaders succeeded in inflaming their passions by harangues and tirades, the decisive argument seeming to have been that after all Henry was not "a constitutional monarch." A rope was fixed about his neck and horse and rider were soon on the ground and broken to pieces; but the pedestal with its chained slaves was left uninjured.

In the hollow belly of the horse, wrapped up in a cylinder of lead was found the *procès verbal* drawn up by Francavilla himself and deposited there at the time of the erection of the monument, and when people found time to read it, it was found to give the lie to many of the fictions relating to the history of the creation of the monument and the truth concerning its sufficiently singular vicissitudes. A similar account was later found placed under one of the horse's feet. The four chained slaves, the hands, the left leg of the king and one of the horse's feet are now in the Louvre, and the head of the king is rumored to survive in some private collection.[2] The bas-reliefs represented the Battle of Arques, the Battle of Ivry, the taking of Amiens, the taking of Montmelian and Henry's entry into Paris. The Latin inscription was as follows:

HENRICO. MAGNO. FRANCIÆ. ET. NAVARRÆ. REGI. CHRISTIANISS. VICTORI. CLEMENTISS. GALLIARUM. RESTAURATORI. ORBIS. CHRISTIANI. PACATORI. OB. AVITAM. PERPET. QUE. CONJONCTIONEM. UTRILLS. QUE. LILI. FRANCI. ET. TUSCI. SEMPER. FLORENTIS. FERDINANDUS. MEDICÆNS. III. TUSCIÆ. DUX. CŒPIT. COSMUS. EJUS. FILIUS. ABSOLVIT. H. ÆTERNUM. BELLICÆ. VIRTUTIS. IPSIUS. MONUMENTUM. MARIA. REG. GALLORUM. REGENS. TANTO. CONJUGÆ. HEN. PARRICIDIO. SUBLATO. MUMES. HIC. RECEPIT. LUDOV. XIII. M. PARENT. MAG. INCREMENTO. PER. MAGISTRAT. URBICOS. CONSTITUIT. POP. URBIQUE. DONO. DEDIT. A. S. M. D. C. XIV.

Two other anecdotes serve to illustrate the feeling that was held toward this statue and its original, one told by Carlyle of an ancestor of Mirabeau who, a member of a troop passing by on its way to take part in the ceremony attending the erection of a statue of Louis in the Place des Victoires, raised his spontoon to his shoulder and "bawled out, 'Friends, we will salute this one; he deserves it as well as some.'" The other is told of the eccentric Sterne, who, one day, seized with an historic frenzy or overcome with artistic admiration, threw himself on his knees before the statue and was lost in contemplation, till at length, perceiving that he had become the centre of a wondering crowd, he cried out to them, "*Qu' avez-vous tous à me regarder! Quittez-moi tous*," at which adjuration the crowd in place of obeying him followed his example and prostrated themselves before the statue.

After a time-hallowed custom this statue was made to play a rôle in some of the pasquinades of the time, or mazarinades, as they were called in France, the interlocutors being the statue on the Pont Neuf and the statue of Henry's son, Louis XIII, in the Place Royale, the date of one that survives being the night of March 26, 1649.

Of the artistic character of the monument, the illustrations give some indications, and the present monument which was erected by Louis XVIII — the metal used being, through retributive justice, obtained from the statues of Napoleon from the Colonne Vendôme and the one at Boulogne, and the statue of Desaix in the Place des Victoires — was intended to be, so far as possible to make it so, a replica of the original. The fragments in the Louvre aid, moreover, in completing the mental picture, for the present pedestal lacks the accessories of the original. We have the queen's testimony that the likeness of the king was excellent, and the testimony of contemporary artists that the king was a better work of art than the horse, while the horsemen of the day protested that the best thing about the monument was the horse. The present horse has much of the sturdy monumental character of the two horses at Florence, and so is probably not unlike the original modelled by Giovanni. Some critics maintained that the man was too small for the horse, and this defect may have given support to the story that the horse was modelled in Italy and the man in France, a score of years later.

Another indication of the popularity of Henry and the persistence of the traditional love for him is, that when Louix XVI, from whom the people hoped so much, ascended the throne, some one inscribed on the pedestal of the monument on the Pont Neuf the word "Resurrexit," while, to mark the antithesis, on the tomb of Louis XV at St. Denis was scrawled, "Hic Jacet! Deo Gratias."

During the Revolution, and probably about the same time, was destroyed the bas-relief of Henry IV — on a background of black marble — which was over the main entrance to the Hôtel-de-Ville, at Paris, and over which was to be read the inscription, "*Sub Ludovico Magno felicitas urbis*," an inscription which might be supposed to indicate the approximate date of its execution were no other fact concerning it preserved. Work on the Hôtel-de-Ville, which had been begun in 1533, was actively resumed during the reign of Henry, and completed by the Italian Domenico di Cortona, Miron, the Prévôt des Marchandes, as the functionary now known as the Prefet de la Seine was then called, pushing the work forward with much activity. As a finishing touch to the work, Miron caused an equestrian bas-relief of Henry to be moulded in lead and fixed in 1605 upon a panel of black marble over the main entrance, the modelling being the work of Pierre Biard, who succeeded in making of it the best portrait of the popular original. It is doubtful whether even a nobler metal would have withstood successfully the unkind treatment measured out by fate against this piece of sculpture. During the last effort made by the Frondeurs, Condé marched against Paris, and sympathizers within the city threw open the gates to his forces, and during the ensuing days of tumult siege was laid to the Hôtel-de-Ville, and, other means of obtaining access to the building failing, a

[1] From M. F. Hoffbauer's "*Paris à travers les Ages.*"

[2] In that of M. Convreur.

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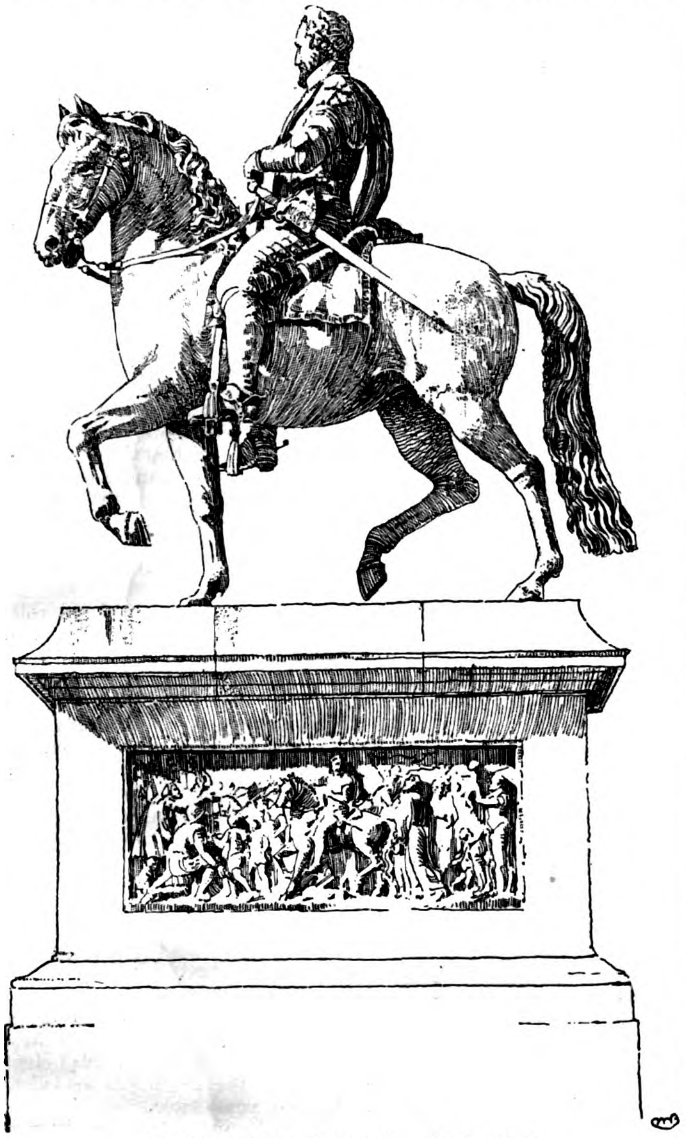
fire was built against the door which resulted, if in nothing else, in partly melting the leaden image over it. Enough of the original, however, was left to make it worth while for Louis XIV to order Pierre Biard *fils*, when quiet was restored, to also restore the sculpture, and this piece of rejuvenation was fairly successful; and, though not so good a portrait as before, was allowed to keep its place till the Revolutionists destroyed it.

The illustration shows a portion of the façade of the Hôtel-de-Ville as it existed before the Commune, and over the door in the place once occupied by the work of the Biards may be seen another bas-relief of Henry, executed by Lemaire. This, of course, was destroyed by the Communists in 1871, when they blew



The Present Statue of Henry IV on the Pont Neuf.

up the building and set it on fire. In the new building, dedicated a year or two ago, the space over the door is differently treated, but none of the later bas-relief have reproduced the female figures which in the work of Biard attended the footsteps of the monarch.

THE PONT NEUF.—The second bridge built over the Seine and the longest in Paris was begun in 1578 by Henri III and finished by Henry IV, according to different authorities, in 1598, 1604 or 1607. It was rebuilt in 1852 and injured by a flood in December, 1885.

HENRY IV.—("The Father of the People"—"The King of Brave Men.") King of France and Navarre; founder of the royal house of Bourbon; born at Pau, December 14, 1553; educated by his mother in the Protestant faith; married Marguerite of Valois, sister of Charles IX, and narrowly escaped the massacre of St. Bartholomew; became king of France, 1589, on the failure of the house of Valois; was opposed by the Duc de Mayenne; defeated the Roman Catholic League at Arques in 1589 and at Ivry in 1590; became a Catholic in 1593; entered Paris, 1594; proclaimed the edict of Nantes, 1598; divorced from Marguerite of Valois, 1599; married Marie de' Medicis, 1600; encouraged manufactures, agriculture and learning; assassinated by Ravaillac, 1610.

JOHN OF BOLOGNA.—Born at Douai, Flanders, in 1525. He went to Italy at an early age, after an apprenticeship at Antwerp, and studied sculpture in Rome and France, founding his style upon that of Michael Angelo. A prolific artist and the best sculptor of his time. His best work is the "Flying Mercury" at Florence. Others are "The Rape of the Sabines"; "Hercules and Nessus"; "Virtue chaining Vice"; the colossal "Jupiter Pluvius" at the Villa Pretolino and the fountains at Bologna, Florence, Petraja and other places; "Samson killing a Philistine"; the doors at the Cathedral of Pisa, and a monument to Ferdinand I in the same city; "Venus" and "St. Luke"; and the equestrian statues of Cosmo and Ferdinand de' Medici at Florence and of Philip III at Madrid. He died in Florence in 1608 and is buried in the Church of the Annunziata.

PIETRO TACCA.—A sculptor of Carrara, who flourished early in the seventeenth century. A pupil of John of Bologna, whom he assisted and some of whose works he completed after the master's death. Tacca died at Florence in 1640. Among his works are a statue of Jane of Austria, four slaves for the statue of Ferdinand I at Leghorn (by G. dell'Opera) and (his best) the equestrian statue of Philip IV at Madrid. In this he was assisted by a wooden model made by Montanes.

PIETRO FRANCAVILLA OR PIERRE DE FRANQUEVILLE.—Francheville or Franqueville (Pierre de), sculptor, painter and architect. Born at Cambrai, 1548; died at Paris, about 1615; studied at Paris and in Innsbruck. In the latter place he studied under a skilful "sculptor in wood." He attracted the attention of the arch-duke Ferdinand, who sent him to Florence and recommended him to John of Bologna (1574), by whom he was (as a fellow-countryman) well received. He studied under him for some time, assisting him in many works. Francavilla's own works are: statues of "Janus" and "Jupiter" at the Grimaldi Palace, Genoa; and statues of saints, evangelists, etc., in San Lorenzo and Santa Croce, Florence. Having made for Jerome de Gondé, a Florentine noble living in Paris, a statue of Orpheus which was seen and admired by Henry IV, the King summoned Francavilla to Paris, gave him an apartment in the Louvre, and entrusted to him several orders. The two most remarkable are the two groups in the Tuileries Gardens, "Time bearing away Truth" and "The Rape of Cybele by Saturn." After the death of Henry IV, Francavilla was appointed Sculptor to the King, Louis XIII, who gave him the work on the pedestal of the statue of Henry IV. He made also a pedestrian statue of Henry IV for Pau. At the Louvre are his "Orpheus," "David vanquishing Goliath" and a bust of John of Bologna.

PIERRE BIARD.—1559-1609. Studied in Italy. Sculptured a "Christ on the Cross," and other figures for the choir of St. Etienne du Mont, Paris. He was also an engraver.

GUILLAUME DUPRE.—Born probably at Paris; died at Paris about 1615; a medallist and coin founder; not much renowned as a sculptor.

PHILIPPE-HENRI LEMAIRE.—Born at Valenciennes, 1798; died, 1880; pupil of Cartellier; *Prix de Rome*, 1821; first exhibited at the *Salon*, 1827. His "Head of the Virgin" (1846) is at the Luxembourg. His chief work is the large decorative group in the tympanum of the Madeleine. His other important works are statues of Louis XIV, Kléber, Condé and Hoche for Versailles, Marshal Chevert for Verdun, Napoleon for the Bourse at Lille, Froissart for Valenciennes, "*St. Isaac harangue l'empereur Valens allant combattre les Goths*" (*composition des frontons de l'église St. Isaac, à St. Pètersbourg*), and a relief of the "Death of Marceau" for the Arc de Triomphe, Paris. Member of the Institute; officer of the Legion of Honor.

FRANCOIS FREDERIC, BARON LEMOT.—Born at Lyons, 1771; died at Paris, 1827; pupil of Dejoux; *Prix de Rome*, 1790; Member of the Institute; professor at the Ecole des Beaux-Arts; officer of the Legion of Honor. Among his works are statues of Cicero, Numa Pompilius and Brutus, the great bas-relief on the *fronton* of the colonnade of the Louvre, representing "Napoleon in a Triumphal Car," and an equestrian statue of Louis XIV (formerly) at Lyons. Also a group of "*La Religion soutenant la reine Marie Antoinette*" for the Chapelle Expiatoire, and the car with two allegorical figures which accompanied the horses of St. Marks during their sojourn on the Arc du Carrousel.

[To be continued.]

THE ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

THE REDPATH MUSEUM OF NATURAL HISTORY, MONTREAL, CANADA.

[Gelatine Print, issued only with the Imperial Edition.]

TENEMENT-HOUSE, ROXBURY, MASS. MESSRS. WINSLOW & WETHERELL, ARCHITECTS, BOSTON, MASS.

THIS tenement-house designed, in accordance with a general plan suggested by Dr. Arthur H. Nichols, consists of a central portion and two lateral wings enclosing three sides of a quadrangle open on the front and towards the sun, each part complete in itself, the only inter-communication being through the cellars. It is in that part of Boston formerly Roxbury, and the lot extends 135 feet on Eustis Street and 75 feet on Adams Street, contains about 10,256 square feet and has a southwest exposure. The central building being as before said set back from the street leaves a fore-court between the projecting wings, which allows the direct rays of the sun to enter each tenement at some time of the day, and ensures an ample supply of light. The basements or cellars are thoroughly lighted by broad area-windows, contain two Buerkel steam-heaters for warming certain rooms of the more expensive tenements, as well as the halls, and air-shafts, and are fitted with coal and wood bins for each family, communicating with coal-shoots so located that carts can back up to them. Here are also capacious storage-rooms, a common bath-room, a repair-shop supplied with benches and the ordinary tools of the carpenter, mason, plumber and gas-fitter to enable the janitor to attend to the incidental minor repairs.

The hall-ways throughout the building are finished in brick with no lathing, and the stair-cases have frequent square landings with as few winders as possible. Each kitchen is furnished with a sink of iron or soap-stone, two set soap-stone wash-tubs, a copper boiler for hot water, an ash-shoot with patent door and damper, also a portable range with a ventilator set in the chimney. The water-closets all open upon areas through which are carried whenever possible all the pipes in plain sight and easy of access; and in order still further to ensure an upward current of air, the smoke-pipe of the steam-heater passes through the main area in each of the larger buildings. This also prevents freezing of water-pipes and no such freezing has ever occurred except where a window was accidentally left open upon a kitchen pipe. There is no paint inside except on kitchen walls, the standing-finish being shellacked white wood.

Many of the rooms are quite small, but as they are conveniently arranged this has proved no disadvantage. Rentals vary from $12 to $21 per month, and the smallest tenements, those in the back part of the central building, being also the cheapest, are always in demand.

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YOUNG MEN'S CHRISTIAN ASSOCIATION BUILDING, LOS ANGELES, CAL. MR. E. A. COXHEAD, ARCHITECT, LOS ANGELES, CAL.

THE building when complete will cost in the neighborhood of $70,000. It has all the appurtenances of a Y. M. C. A. building with reading-room, library, reception-hall, recreation-room, class-rooms, auditorium 68′ x 44′, the space under forming the gymnasium. There are also lockers for 600 in basement besides swimming-bath, private baths, etc.

THE HOTEL DE VILLE, PARIS, BEFORE THE COMMUNE.

SEE article on "Equestrian Statues" elsewhere in this issue.

SCENES ON THE PONT NEUF, PARIS, FRANCE.

THESE illustrations are reproduced from "*Tableaux Historiques de la Révolution Française,*" in connection with the article on "Equestrian Monuments."

THE ROYALL HOUSE, MEDFORD, MASS.

FOR description see elsewhere in this issue.

COUNTRY HOUSE DESIGNED BY MR. R. H. ROBERTSON, ARCHITECT, NEW YORK, N. Y.

THE ISAAC ROYALL HOUSE, OR THE "PLANTATION," MEDFORD, MASS.

The Royall House 100 Years Ago.

ELOQUENTLY do these fine old houses of the past, some charged with momentous associations of the Revolutionary era, all with historic interest, in the silent dignity and mellowness of their age arrest our observation as we hurry by in these mercenary days. How captious and offensive appears the intrusion upon their old acres of the speculative builder of to-day, and what a mockery the display of crazy art in the encroaching villas of the city clerk and commercial money-grubber. We hail with pleasure the slow awakening of local authorities to their duty of withholding the destroying hand and the preservation of their historic and architectural treasures.

Look at the house in question, with everything to commend it as a fine specimen of domestic architecture of its period. We now see its enriched cornices, bold fluted pilasters and entrance doorways crumbling away for want of a coat of paint. The old-time blinds hang tremblingly aslant on their rusty hinges. The boundary wall with its two gateways is gone. The drive-way a public street, and the noble elms, which once were the glory of the place, reduced to kindling wood. Look at Elmwood, Cambridge, — that also is to be laid out in building lots. There is a fine old house in Dorchester now completely enshrouded by a belt, not of its own patriarchal foliage, but of puffy, cheap "suburban residences," while several fine reminiscent buildings in the same district are in the last stage of dissolution.

In contrast to these note the Fairbanks House, Dedham, now in the hands of the Dedham Historical Society, the Rumford House, Woburn, similarly cared for, and the Vassal House, 1759, (Longfellow's) is, we believe, to be put into the hands of trustees for preservation to future generations. All honor to this movement, not at all too early. New England and the Bay State especially should be in the van to rescue her crumbling memorials of Revolutionary times and of the men associated with the proudest chapter of her history. As club-houses or museums many of these buildings could be readily, appropriately and economically converted to local requirements, with the advantage of possessing intrinsic merit in their historic associations.

Isaac Royall, a descendant of William Royall or Ryall — mentioned by Hazard as being sent over to this country as a cooper, or cleaver, in 1629 — after amassing a fortune in Antigua, most probably in the traffic of Antigua rum, on returning to New England selected Mystic, now Medford, as a resting-place for his declining days, and buying the estate, built his house in the year 1737. In the laying-out of the estate is manifested a refined taste, — so perceptible in the house itself that it appears strange that no architect's name should be associated therewith. Alas, will the name of the architect ever be of any account in this world? Why should the fat and flourishing builder who polishes off all the plums alone be considered worthy of mention with the proprietor in the criticisms of the daily press? Were the name of the architect duly and justly appended to the building itself, would not a grand stimulus be offered for his best endeavor?

Returning to the house, we find it built of brick, though sheathed on three sides with wood. The court-yard front faces west and also the garden proper, which is a large enclosure directly opposite. The east front, named "the garden front" in the sketch, faces the lawn, which slopes gradually down to the street, which used to be the old Boston road. Why is it that we now-a-days find the term "road" too ignominious and that every thoroughfare must be everlastingly called a "street"? There is a broad walk to the entrance on this side, and a visitor arriving by carriage either alighted at the central gateway or passed by the drive which bounded the estate on the right hand, or north, under the shade of magnificent elms and beeches to the court-yard and principal entrance. It is a curious fact that the house literally turns its back to the public road and its principal front demurely hides its face in the privacy of its own acres.

Emerging from the western door, we can readily picture its good-meaning proprietor mounting the steps of the family coach and rolling away to the Boston Town-House, where, as a member of the General Court, he long served his fellow-citizens of Charlestown. Be it here mentioned that Isaac Royall, the builder of this mansion, died close upon its completion, his widow surviving him only eight years and also dying here. Isaac Royall the second, an owner of considerable property in Boston and Medford, and whose wealth was also to a considerable degree accumulated in the traffic of Antigua rum, appears to have justly estimated his patrimony and taken good care of it. We may be sure his sideboard would be well supplied and the hearty old-time hospitality dealt out with no niggardly hand.

There appears a very perceptible distinction in the architectural treatment of the two fronts of the house, that facing the lawn and road presenting a genial look of invitation and welcome, the western front assuming a severe austerity which seems at once to bespeak the civic magnate.

The interior reception-rooms are very similar to the guest chamber, with more height, and whose deeply-recessed windows, with their ever-accommodating seats, seem still to whisper secrets of old-time gossip or sacred trysts held in their ample seclusion. Here we may picture George Erving or Sir William Pepperell paying their court to the merchant's two daughters with all the gallantry of that age. May we not follow them out into the hall, past the handsome old staircase with its richly-turned balusters and newel, across the pebbled court, through the quaint square garden, with its box-edged flower-beds and walks, to the summer-house (now demolished), a structure of no mean design, with its fluted Ionic pilasters and lantern roof surmounted by a winged Mercury? Here we will bid them adieu amongst the columbines, sweet-scented briar and rosemary "pledged to remembrance."

The low brick building at the end of the court-yard formed the quarters of the bevy of twenty-seven slaves Isaac Royall thought it good to bring with him from his tropical home; and until lately was to be seen the large arched fireplace and oven, now altered for the melting of maple syrup, but the substantial masonry is still there.

Colonel, or Isaac Royall the second, who served in King Philip's War, made the greatest mistake of his life in evading the service of his country during the time of the Revolution. His heart was here and bound up in her future welfare, but, because of an insurmountable dislike of contention and conflict, he left his estate, and after declining to serve as councillor, though summoned by mandamus, he managed to get away to England, only to have his new home and well-cultivated grounds confiscated.

Drake, in his "*Landmarks of Middlesex,*" from which his history has been deduced, sums him up in a kindly and very honorable manner. "Peace be with the absconding royalist for an inoffensive, well-meaning, but shockingly timid old Tory. He would fain have lived in amity with all men and with his king too, but the crisis engulfed him even as his valor forsook him. His large-hearted benevolence showed itself in many bequests to that country to which he was alien only in name. The Royall professorship of law at Harvard was founded by his bounty. There was a town (Royalstone) in Massachusetts, named after him and he is remembered with affection in the place of his former abode."

It is noticeable that Penelope Royall, sister to Isaac, married Major Henry Vassall, whose brother, Col. John Vassall, had conveyed to him the "Brattle House" and estate, Cambridge. When the New Hampshire "rangers" pitched their tents in Medford, Col. John Stark found Madame Royall and her accomplished daughters occupying the house, and they willingly took him in as a safeguard against insult or any rough handling of the soldiery. Her confidence was not misplaced, for the bluff old ranger, we learn, paid her and her daughters every respect in return for their hospitality. Not long after his arrival at the camp, General Lee took up his quarters in the Royall Mansion, whose echoing corridors suggested to his fancy the name of Hobgoblin Hall. Washington required him to remove nearer to

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his command. After Lee, Sullivan, attracted by the superior comforts of the old country-seat, fell into the same error and was remanded to his brigade by his chief.

In 1810, the mansion came into the possession of Jacob Tidd, in whose family it remained for half a century, and is now better known by the name of the Tidd house than by the old royalist's name. Ensconse yourself in any corner of the estate and look at it how you will, a dreamy quiet will steal over your senses, while your imagination runs riot in repeopling its broad walks and avenues, its echoing hall and chambers with a quaintly-costumed company, who seem to look askance at your look of surprise, yet bid you welcome to their memories and associations. You turn away with unfeigned regret and a sense of pain that the iconoclastic hand of to-day should be so ruthless in its haste to remove the old landmarks of our earlier country.

AUTUMN JOURNEYS IN MEXICO.—II.[1]

VERA CRUZ.

Vera Cruz.—The Sea-Wall.

To the Mexican, Vera Cruz speaks of wealth. There was something prophetic in the name given by the Spanish conqueror in 1519 to the city which he proposed to build on the spot where he had landed his men on Good Friday of that year—*La Villa Rica de la Santa Vera Cruz*—the *Rich* City of the Holy True Cross. Circumstances caused the removal of the city four times, but the fourth removal brought it back in 1600 to the original site selected by Cortez, and there the city was planted, and there it grew. It became a *rich* city indeed, representing for the most part the wealth of the country to which it belongs. It is the principal port of entry in the Republic. Before the Independence of Mexico (1821) its exports and imports aggregated about thirty millions annually, from which Spain derived a large revenue. The business of the port has decreased since railway communication with the United States has diverted the course of trade, but it is still an important commercial town. It has something over twenty thousand inhabitants. At one time, in the history of the Republic, when the country was overstocked with presidents—one of them being snugly ensconced in the big presidential chair at the capital—the other one set up his government in Vera Cruz, and supported it out of the revenues of the port until he could defeat his rival and open the way up to the capital.

Vera Cruz being reached after dark, there is no chance until the next morning to make observations of any of the features of the city excepting the hotel. The cool breeze is blowing off the Gulf, but the fact that the traveller is in the hot lands is obtruded upon him by the construction of the hotel. It is the "Hôtel de Mexico," fronting upon the mole and custom-house, and looking out over the water of the Gulf of Mexico. It is of four stories—an unusual height for a building in Mexico—and the floors of the immense halls from the ground to the top story, and the roof as well, are of iron gratings, thus ensuring the greatest amount of ventilation possible. But these iron gratings give to the traveller as he passes over them a sense of insecurity. Crossing the hall carelessly in the fourth story, he is apt to be filled with sudden alarm, when upon looking down he sees the floors below him. He appears to be standing upon a skylight and makes haste to get off. Even familiarity with these gratings fails to overcome the nervousness. It lasts as long as the traveller remains in Vera Cruz.

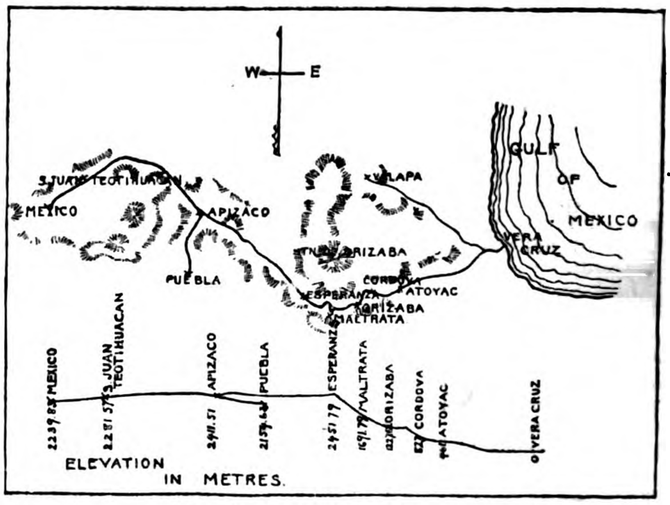
There is one feature of the dingy Hôtel de Mexico which won my admiration, and is worthy of imitation in other countries: the baths were of blue-and-white figured, glazed tiles. How clean and cool they looked! The bath is a feature of every Mexican town, but those tile-basins were the most attractive of any I saw in the country. These and the *huachinango* (red snapper) fresh from the Gulf, served up for supper, were the redeeming features of the Hôtel de Mexico.

There may be time after supper for a stroll in the main *plaza*, which is particularly attractive at night when the band plays, and the Vera Cruzans come out for a promenade under the watchful eyes of mammas or aged duenas. One's first impression of the Vera Cruzanas is that they are more voluptuous looking than the ladies of the other cities. Mexican ladies generally are of slight build, but the Vera Cruzanas are fully in accord with the vegetation of the tropical land in which they live. They adhere more closely to the typical dress of Mexico—the mantilla of lace in place of hat or bonnet—than the ladies of the capital, where French dressmaking and millinery have entered within the past few years. On the *plaza* of Vera Cruz one's first lessons in the different races composing the population of Mexico, may be taken. All are represented in Vera Cruz. The "whites" are the European residents or their descendants. The Indians, or natives, are the opposite class. Negroes abound and these three races are mixed as follows: "Mulattoes," whites and negroes; "mestizos," whites and Indians and "zambos;" Indians and negroes. Even at night the difference between Vera Curz and the inland cities is quite marked, in population and otherwise. Its resemblance to the West Indian cities is striking. The Spanish spoken is more like that of Cuba than that spoken in the interior of Mexico.

By day the first object to which the attention is directed, is the fortress of San Juan de Ulua, off the coast in front of the city, and the traveller will not fail to take a boat and go over to inspect it. It is built upon an island on which the great conqueror landed the day before he established Vera Cruz, but the island has entirely disappeared under the masonry of the fort, which now seems to rise directly from the bottom of the sea. It was begun in 1569, and not finished until 1633. It is considered the strongest fortress in the western hemisphere with the exception of Quebec, yet, it will be remembered that General Scott, in 1847, got behind it and landed his troops in Vera Cruz. It is now used principally as a prison, and the prisoners set upon the traveller immediately upon his landing and beg him to buy grotesquely carved cocoanut-shells, upon which they expend all their time. An intelligent guide is detailed to show the visitor about the fortress and point out the light-house, the weather observatory, and, most curious of all, the black and dismal dungeons in which the worst classes of prisoners are kept, below the level of the sea.

Nothing on this Continent could be more beautiful than the view of Vera Cruz from this great fortress: it is suggestive of Venice. If the day be clear, the mountain ranges back of the low line of buildings close to the water's edge, will be in full view, and among them will be the beautiful snow-covered peak of Orizaba.

The city presents little that is architecturally interesting. There are not many churches worth visiting, and churches are generally the most interesting features of Mexican cities. The Reform laid a heavy hand on the Church in Vera Cruz. It was from that city that the famous "Reform" decree was issued, and many of the churches have been turned to secular uses. One church tower has been turned into a light-house, and bears the name of Juarez, the author of the infamous decree confiscating the property of the Church. A former monastic building is used as a city-hall. The business houses near the mole are substantial, but otherwise unpretentious. In the outskirts of the city the houses of the poorer class are built of bamboos and thatch. They are of the class of houses known as *jackals* in Mexico. There is a suggestion of a northern seaside summer resort in the sandy soil and the well-ventilated residences out a short distance from the business portion of the city.



The Route of the Mexican Railway.

The Alameda is the most picturesque feature of the Vera Cruz. The pavement, the fountain and the benches, all of masonry or a sort of concrete, are sadly dilapidated now, showing that the Alameda is no longer a fashionable resort. But the rows of cocoanut palms on both sides form a beautiful picture.

Vera Cruz is considered the cleanest of Mexican cities. In my next paper I shall mention a cleaner city—Jalapa—but, nevertheless, Vera Cruz *is* remarkably clean. The streets are built on a slight grade, and have a drain running through the middle. But to the turkey buzzards, constantly hovering over the city, is due most of the credit for the city's cleanliness. It is well that Vera Cruz is clean. Without its drains and its turkey buzzards, the *vomito* would

[1] Continued from No. 653, page 306.

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be much more severe than it is, and the unhealthy season would be longer. As it is, it is perfectly safe to visit the city any time between November and April. Arthur Howard Noll.

BOOKS AND PAPERS

M. COUGNY'S is a capital book which ought to be read by all persons engaged in, or interested, in teaching. It describes the revival which took place some few years ago in the manner of teaching drawing; it gives the programmes of the different classes of schools, and it winds up with hints as to the arrangements of class-rooms for drawings, and the budget of the municipality for this department.

Two questions of moment are fully answered by the author — the error of the modern system of excessive division of labor, and the necessity of teaching the entire nation to draw; not necessarily in order to execute pictures, but in order to learn to observe, and to be able to carry out an idea. People do not all, as a matter of course, use their eyes; many are as blind as others are deaf — "*l'un écoute sans entendre, l'autre regarde sans voir,*" said Charles Blanc. "*Le monde se déroule devant les yeux du plus grand nombre comme une espèce de fantasmagorie où les formes changent, sans que rien vienne imprimer un souvenir précis dans leur esprit,*" (discourse of M. Poubelle at the Sorbonne, 1886); again, Decamps, in exposing the fallacy of Horace Vernet's pet phrase, "*Faites ce que vous voyez?*" justly and correctly remarks, "*Voir la nature, est une formule que le moindre examen reduit presque aux proportions d'une niaiserie. S'il ne s'agit que d'ouvrir les yeux, le premier rustre le peut faire; les chiens aussi voient. L'œil est sans doute l'alambic dont le cerveau est le récipient; mais il faut savoir s'en servir. . . . Il faut apprendre à voir.*" But how are people to learn to see? By learning to draw in their childhood. "*Avant d'apprendre à l'enfant à lire, il faut lui apprendre à voir,*" said Rousseau; and Jean Jacques was right. The earlier a child begins to draw, the quicker will be his power of observation; and whether a person has to pass his life in service, or in trade; in town or country; whatever may be his calling, a quick perception will be an immense gain. Therefore, says M. Cougny, it is necessary for every one that he should be taught drawing as he is taught to write, whether he be an agriculturalist, a manufacturer, a laborer, or a workman. Drawing should be part of a compulsory system of education, and as a necessary consequence, it should be free. The *écoles maternelles* are infant schools, modelled upon the Frœbel system of *kindergärten*, but with slight variations. What a much prettier name, by the way, than either the German kindergarten or the English infant school! Motherly school sounds even inviting to the child mind. At these, babes from two to seven years of age learn to make straight lines and curves, and to copy simple objects from the blackboard.

In the *école primaire* an advance is made. These classes include children from seven to twelve years, and the time spent upon drawing is from half-an-hour to two hours twice a week, the lessons being conducted by the ordinary teachers. The course consists of model and geometrical drawing. In the *cours supérieur* (children from eleven to thirteen) drawing from casts of ornament, from the round, and the elements of perspective are added by a special drawing-master; and manual, or technical education is commenced — not with the view of teaching a trade, but simply to educate the hand in skilfulness. Boys are taught the use of tools, turning, black-smithing, and such like work; girls, cooking, needle-work, cutting out, and so on. It is necessary to point out the usefulness of drawing in all these works? Would it be possible for a servant to put dishes all awry upon the dinner table, or for a dressmaker not to see how to cut out a costume from a sketched design, if one or other had learned to draw? The next step upwards, is the *cours d'adulte* for children after leaving the primary schools. These are held in the evening, in the same buildings as the day schools, and number between fifty and sixty. The *école professionnelle* was an idea of Eliza Lemonnier who founded the first for girls in 1848. These now number three, besides five others subventioned by the city. In all of them some fees are paid; the course consisting of classes for geometrical drawing, ornament, the figure, the life, anatomy, perspective, art history, and modelling, besides certain technical classes.

In 1882 a commission was held, to enquire into the question of the want of artistic feeling in the art manufactures of France; and the delegates of the various trades were unanimous in attributing the downward paths that French craftsmen had been pursuing, to the want of a knowledge of drawing, and the excessive division of labor. Watch-making, for instance, from being almost exclusively a French art, had left France for Switzerland, England, and America. This is true enough; but M. Cougny need not fear the rivalry of America in *artistic horlogerie*; the fact of France producing no more of the elegant watches and clocks of the seventeenth and eighteenth centuries, is mainly due to the absence of a demand for them.

Our watches are cheap (and I might say "nasty," *i. e.*, ugly) and as every man, women, and child now wants one, naturally they are produced to suit the pockets of the many. The same reason produces cheap flowers and fans. The best artificial flowers still come from France, indeed all others are wanting in taste; but inasmuch as all women and children, from the shop-keeper down to the street flower-girls, feel it incumbent upon them to hoist glaring roses and geraniums upon the top of their dirty hats, the supply of common and cheap flowers is necessary. A girl who loves finery, and can give eight cents for a flower, obviously cannot give fifty cents, even if she had the taste to prefer the dear one, which is highly improbable. And the same remarks apply to all art-trades, for there is scarcely an industry in which the superior taste of the Frenchman does not show itself. The Anglo-Saxon is ingenious and can produce cheap articles, but of taste he has, by nature, little or none. His work is strong and solid and good, or cheap and common and bad; but in either case wanting in artistic feeling. Therefore, from the art point of view, M. Cougny may be comforted; France holds her own still in artistic manufactures, unless cheapness alone be required. But if people want spurious art at a low price, of course America and England carry off the palm. As another example, observe the fans produced by the different countries; is there any comparison between those of France (and I ought to add Italy) and those of England, America and Germany? *Apropos* of fans, how many persons dream of the division of labor in that trade? It seems incredible, but M. Cougny tells that as many as fifteen and twenty persons are engaged in the production of one.

The result of the enquiry was the establishment of technical schools which should take the place of the old system of apprenticeship. In these, boys and girls are taught trades *professionally;* the technical classes of the other schools only being intended to make the children useful and skilful with their hands. But in the *écoles professionnelles* a boy, or a girl, serves a regular apprenticeship, and after three years, earns a certificate of proficiency in the trade. And here again, division of labor is as much as possible abolished. A girl who learns artificial-flower making, not only makes the parts of the flower, but she mounts them — which is not the case in the trade. The silversmiths and blacksmiths learn each part of their work, and a cabinet-maker not only makes the woodwork of his chair, but he carves it, stuffs it, and covers it, moreover, everything that is required in the different trades is made in the workshops. The result of this teaching will be seen in next years' Paris exhibition, as the pupils of the various schools are now engaged in fitting up an entire room, and making all its contents.

A great deal of the teaching is oral; and the pupils in addition to the subjects already mentioned, study designing for textile fabrics, ceramics, wall-decorations, etc., in *ateliers* specially arranged for the purpose. As M. Cougny says, "of what use is a good design, if the designer be ignorant of the processes of re-production? The motive of decoration must be appropriate to the material. How can an artist design wall-papers if he knows nothing of the process of paper-printing?" "*Fût-il un génie, le résultat sera nul, et quand on lui montrera l'effet produit par son ouvrage, le dessinateur n'en voudra pas croire ses yeux.*"

Boys between the ages of thirteen and sixteen, enter these schools by passing a simple examination. The course of instruction at the École Diderot (which is typical of the others), consists of the following subjects besides what is obligatory at the primary schools: French, mathematics, technology, history, geography, book-keeping, and the elements of physics, mechanics, and chemistry. The technical course consists of blacksmithing, engineering, carpentry, turning and carving, — all the pupils passing through each *atelier* during the first year. The daily work occupies six hours in the workshops, and four in the class-rooms for the first two years, and eight hours in the workshops and three hours in the class-rooms, the third year. At present Paris only possesses five of these technical, or apprentice schools, but it is intended to open more, and to include book-making (printing, binding, and the making of types) lithography in black and color, building, and masonry, for in all these trades, division of labor is so thoroughly carried out that the workman is, at present, only a human machine. A draughtsman designs a chair, a carpenter makes it, a carver decorates it, (or rather one man does the simple work, while another carves the figures or flowers); then comes the upholsterer to stuff and cover it — and not one of the men knows anything of the others' work. It is said to be better for trade, as celerity is gained by this system. But is rapidity and cheapness of production everything? Are there not many industries in which it would be gain to all persons concerned, if the products were fewer and more expensive? Besides, is man to be sacrificed to the product, or the product to man? If a man turns out an entire piece of work, if a woman makes an entire dress or bonnet, both feel a pride in their handiwork; but imagine the dreariness of always making the legs of a table, the sleeves of a dress, or the foundation of a bonnet! It is true the masters are against the abolition of this system; but if the men choose to educate themselves to be craftsmen instead of machines, the masters will have to put up with it. It is a workmen's question; and there is no doubt that when once they see the charm of carrying out their own designs as did the old craftsmen, they will be ready enough to change their system, and abolish specialists.

And the cost of the various classes for drawing in Paris? Nearly a million of francs; and be it noted that the money is not absorbed by the professors. Five inspectors receive 44,500 francs; directors receive 3,000 francs, masters 2,000 francs, and mistresses 1,200 francs

[1] "*L'enseignement professionnel des Beaux-Arts dans les Ecoles de la Ville de Paris,*" Par Gaston Cougny, Paris: Maison Quantin.

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per annum; rather an unfair arrangement considering that the women work as hard as the men. The budget is based upon an economical foundation, but still the expenses are high, mainly from the fact that most of the instruction is free.

Mr. Cougny's book gives a list of subjects for examination, an account of prizes to be won, and various other details; and closes with a hope that before many years pass away, each school may have a museum attached to it. As at present organized, there is some truth in the saying that "*Les musées ne sont que les cimetiéres de l'art, des catacombes où l'on range dans une promiscuité tumulaire les restes de ce qui a vécu: une Venus voluptueuse à côté d'une Vierge mystique; un satyre à côté d'un saint: Luther en regard du pape; un tableau de boudoir en pendant à un tableau d'autel,* (Théophile Thore); and Viollet-le-Duc gives vent to a similar sentiment: " *Nos Musées sont faites bien plus pour la montre que pour l'étude.*" This is only too true; but many town-councils have acknowledged the fact, and created what might be called industrials museums attached to technical schools. Mr. Cougny gives an account of the one at Berlin, which is a type of those existing at Munich, Nuremberg and other German towns.

In conclusion, who will not endorse the words of J. J. Rousseau; "*Savoir se servir de ses doigts est une supériorité dans toutes les conditions de la vie.*" Why manual work should ever have been despised, it is difficult to say; but the days when trumpery clerkship is considered a more gentlemanly calling than a skilled craft, are probably numbered.

S. Beale.

SOCIETIES

ARCHITECTURAL LEAGUE COMPETITION.—ANNOUNCEMENT.[1]

THE Architectural League takes pleasure in announcing that it has instituted, in connection with its exhibition, an *annual competition,* open to all draughtsmen in the United States under the age of twenty-five, the object of such competition to be the promotion of good designs and the improvement of draughtsmanship.

As prizes it offers to the design placed first a gold medal, to be known as *the Gold Medal of the Architectural League;* and to the design placed second, *the Silver Medal of the Architectural League.*

The conditions for admission to the competition are:

First.— That the competitors shall be residents of the United States, and under the age of twenty-five; and,

Secondly.—That the drawings shall be made in conformity with the following programme, and, in all parts and portions entirely by the hand of the competitor.

The drawings will be judged by the jury appointed for the purpose.

The successful drawings, and such others as may be thought worthy, will be hung at the exhibition, the first and second prize drawings being so indicated, and these latter shall thereupon become the property of the league.

John Beverley Robinson, *President.*

Frank A. Wright, *Secretary,* 47 Liberty Street, New York City.

PROGRAMME.

For the second annual competition the following programme has been arranged:

The drawing shall exhibit *The Tomb of an Illustrious Architect.* The base-course of the tomb not to exceed in area 144 square feet; the size of the plot, 25 × 25 feet.

Each contributor to exhibit two sheets of drawings; one to contain plans and elevations at the scale of one-half inch to the foot, and one to exhibit a perspective view. The plan and elevation sheet to be finished in line with India ink and the lining-pen. No brush-work on this sheet, except sections. No shadows are to be cast.

The perspective to be rendered at will. Each sheet to be cut to the uniform size of 24 × 32 inches, and to be white card or Bristol board, or Whatman paper mounted on a stretcher. No colored borders, frames or glazing will be allowed.

Each sheet must be distinguished by a motto or cipher. A sealed envelope bearing the same motto or cipher must contain the name, full address, place and date of birth of the author, and must be mailed to the office of the Secretary, Mr. Frank A. Wright, 47 Liberty Street, New York City.

Drawings are to be delivered flat, carriage paid, on or before December 5th, 1888, to Frank A. Wright, Secretary, No. 368 Fifth Avenue, New York City. They will be returned at the close of the exhibition at the expense of the contributor.

Charles T. Mott,
Charles A. Rich,
Ernest Rollin Tilton,
Committee.
John Beverley Robinson,
Frederic Crowninshield,
Ex-officio.

[1] A copy of the above circular can be had by applying to E. R. Tilton, secretary of the Medal Committee, 23 Warren Street, New York City.

AMERICAN INSTITUTE OF ARCHITECTS.

The Twenty-Second Annual Convention of the American Institute of Architects will be opened at the Buffalo Library Building, in the City of Buffalo, New York, on Wednesday, October 17th, 1888, at 10 A. M. The Genesee Hotel (within two blocks of the meeting hall), is suggested as the headquarters.

Rates to the Institute members, $3.00 per day, American plan, or rooms without board, $1.00 per day and upward. This hotel furnishes a "Headquarters" parlor free to the Convention.

Please notify Committee at Institute office, 18 Broadway, New York, by return mail, what papers you propose to read.

W. W. Carlin,
Emlen T. Littell,
A. J. Bloor,
Committee of Arrangements.

MASTER STEAM-FITTERS' ASSOCIATION, CHICAGO.

The Master Steam-Fitters' Association of Chicago has been in existence for over a year and the benefits derived by the trade have been so great that we believe it will be to your advantage to organize a similar association at once. To that end we offer you the benefit of our experience and will give you any assistance in our power and answer any questions you may wish to ask.

When a sufficient number of associations have been started in the Western cities, it is our intention to call a convention of delegates from the different bodies to organize a National Association for our mutual benefit, similar to the Master Plumbers.

Besides cultivating a friendly feeling toward each other by our social intercourse, we have accomplished, among other things, the following: Successfully resisted the demands of the union strikers; established uniform hours of labor; established uniform discounts and prices for materials.

We again urge you to organize at once and notify us when your organization is completed.

If you already have an organization perfected, you will oblige us by sending the names of the officers to our secretary, and any other information you think will interest us. Our interests are mutual and we feel that much good can be accomplished by united effort.

The Master Steam-fitters of Chicago.

C. H. Simmons, *Secretary,*
72 Market Street.

COMMUNICATIONS

WILL SOMEONE ANSWER THESE QUESTIONS?

Boston, Oct. 4, 1888.

To the Editors of the American Architect:—

Dear Sirs,—Your paper has been taken in the office of this Company for many years. It has been useful to myself and to the experts who are employed in the supervision of mills for fire purposes or who are engaged in making plans and specifications for the safe construction of mills, works and mill store-houses. Your paper has contained many valuable treatises, accounts of scientific investigations, forms of contract and the like. May I be permitted to suggest, however, that the weekly illustrations and inspections of many buildings, such as churches, college-buildings, school-houses and the like would be very much more satisfactory if they were accompanied by such plans or working-drawings of the framing and of the interior construction as would enable one to know whether they would be safe and suitable buildings or whether they might not be examples of the common practice of combustible architecture.

It is seldom that one finds either in your paper, or in any other publication devoted to architecture, such a plan of the construction, specifications, and description as would enable a student to decide whether the building had been or would be well-constructed or not; whether the timbers were rightly computed and adjusted; whether the computations on which the floors and columns had been specified had been considered with a view to a true factor-of-safety; whether or not the timbers had been mangled by bad framing, by mortise and tennon or other device for weakening the strength at critical points; whether or not there were suitable cut-offs in the walls to prevent the passage of sparks or of fire behind the framings or in the partitions or whether or not the building might not happen to be a cellular structure in which all the wooden flues from the cellar to the hollow roof were well connected so as to assure the maximum of loss from the minimum of cause, together with the unobstructed range for incendiary rats and mice.

Why is it that churches are, as a rule, bad fire-risks even when the outer walls are of brick or stone? Why is there customarily an open wooden flue from hollow floor to hollow roof? Why do we burn two hospitals, asylums or almshouses every month, with a large loss of life every year? Why is it that within a radius of half a mile from the Old South Church, including what may be called the section

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of Boston to which the attention of architects has been given more than to any other, there is not one building in ten, probably not one in fifty which if moved out into the centre of a ten-acre lot, detached from all other buildings and fitted with all its present appliances for the extinction of fire would not be refused by any or all of the Factory Mutual Insurance Companies if asked to insure it without an almost complete re-construction of the interior?

Why is it that cotton and woolen factories, paper-mills and wood-working shops have been much safer and better fire risks than the average church, hospital, asylum or college building?

Why is it that there is grave distrust on the part of those who propose to construct mills, works or other buildings for industrial purposes, of the competency of most of the professional architects?

Why is it that when due regard is to be given to strength, to safety from fire, and to the disposition of the timber in the best manner to meet the special requirements of the mill, or of the factory storehouse, that the average architect is seldom consulted at all, except to fit a design or outside elevation, to the conditions of the structure already determined upon without such previous consultation? What indications do you customarily give in the designs which you print, to show that any attention has been given to the conditions of stability, freedom from vibration, or safety from the ordinary risks of fire?

I confess that when I so often read an account of the destruction of a college building or a library by fire, I put to myself the question: What has the education been good for in that college if the men in charge of it are incapable either of determining for themselves what safe construction may be or of selecting an architect by whom the rules of safe construction may be put in practice?

When I read of the destruction of a hospital, aysIum or almshouse, and when I know from the personal inspection of State hospitals and prisons not far away, that many of them are nothing but costly whited sepulchres waiting only for a spark to subject the inmates to cremation, I am apt to ask myself if there are not more incompetent people in this community who might be called feeble-minded than have yet been committed to asylums for that class.

When I find upon the school-houses of Boston apparatus intended to secure the escape of the pupils in case of fire, which has been in position many years, which when practically examined (after being put on trial by newspapers) by myself and one of my inspectors formerly on the Boston Fire Department when this rubbish was put up, that *is found to be a useless fraud*, I can but ask the question whether or not the true kind of education in *building* and architecture has yet been given, after all the attempts that have been made to raise the profession of architect above that of a mere draughtsman, pictorial designer or copyist of art which does not suit our climate or our conditions. I confess to becoming savage and cynical as I witness the unnecessary destruction of property by fire which is due to incapacity, ignorance or what may be called artistic imitation.

In this criticism I do not intend to refer to the very expensive fireproof buildings which are becoming common in the principal cities, constructed without regard to cost and with a view to absolute safety. What is needed is that the average structure which the owners cannot afford to make fireproof may be made very much safer than they commonly are. I am well aware that the greater part of the difficulty lies with the owners and not with the architects; but it is not always so. I have reason to know that many persons who have been responsible for the re-construction of buildings after they have been injured or destroyed by fire, especially in several cases of college buildings, have immediately given instruction to their architect to adopt safe methods of framing and building, on receipt from ourselves of some of our official documents relating to the safe construction of factories. It is now my common practice whenever I see a notice in the paper of the destruction by fire of a hospital, an asylum, or a college building, to become an anti-combustion missionary and send these documents to the persons whom I may assume to be charged with rebuilding. In several cases I have positive knowledge that these documents have been gratefully received and plans have been immediately altered and amended and right methods have been adopted on receipt of them. I have therefore good reason to attribute a very large part of the dangerous construction of such buildings to the fact that, as a rule, the architect consulted usually follows an extremely bad system of construction, and the persons who are responsible for placing the contracts have never had their attention called to the fact that these costly methods are thoroughly bad.

Might not architects find out a way similar to the one which we adopt in dealing with our members, to wit: to prove to owners that safety and true economy go together? That good construction of buildings of a permanent character costs no more than bad; often less? The large factories which have lately been constructed of the most solid kind, brick, stone, timber and iron combined with a view to strength, stability, light, ventilation and the like, cost on the average about seventy cents per square foot a floor above the foundation, or less than $5 per foot of ground covered, six floors high, including foundations of average cost on good ground. The basement floors, when made use of, are laid in such a way as to be safe from what is called dry-rot. The roof is so constructed that the upper room, in place of being an oven in summer and a refrigerator in winter, is the best room in the factory. It may be alleged that the problem of mill construction is one for the engineer to cope with rather than for the architect. Is it so? Are not the same rules which make the mill safe, solid and durable, suitable to the city warehouse?

I witness even in recent city warehouses, to which great attention seems to have been given to secure solid and safe construction, errors which no skilful constructor of mill buildings would ever commit, especially in the disposition of the materials of the roof.

I am aware that architects meet these suggestions with the comment that the factory underwriters deal only with the skeletons of buildings; with the naked walls, the timbering, the posts and the floors. This is very true; but there are many methods of clothing this skeleton safely and suitably without excessive cost; there are plenty of methods of carrying out the principles of safe construction without losing sight of artistic design. None knew this better than the late H. H. Richardson, and no one had greater skill in applying safe methods to some of the best and most artistic of his later buildings.

Having lately been called upon to deal with a class of buildings, in the construction of which the underwriters had not previously been consulted, I have again been painfully impressed with the costly and wasteful system under which the art of combustible architecture is still practised in many places. EDWARD ATKINSON.

[As we feel that there may be several architects who would like to answer the specifications of this challenge, we will not throw obstacles in their way by answering any part of it now. — EDS. AMERICAN ARCHITECT.]

A SCULPTOR'S STUDIO-GARDEN.

Commend me to a garden neat,
  A quiet modest small retreat,
With just enough of shrubs and flowers
  To vary now and then my hours,
And cheer the mind and rest the eye,
  With art when somewhat tired out,
Where, from my studio close by
  With Nature I can walk about,
And rest and muse a little while,
  A little space — some twenty paces
From end to end — t'will make you smile,
  For that is all its space embraces,
With gravelled walks, and little beds
  Where little flowers raise their heads,
And little shrubs — for none are tall,
  And vines and jasmine line the wall.
No one admires more than I
  The gardens of Nobility,
With vast variety elate
  In all their vegetable state:
Yet, not for me is multitude,
  Each flower scarcely known by sight
And most but at a distance viewed,
  Acquaintanceship by far too slight!
O! not for me is aim so great,
  But rather a homely *tête-a-tête*
With the few I love to tend,
  Where every plant's my intimate
And every flower my friend.

J. B.

NOTES AND CLIPPINGS

SELF-EXTINGUISHMENT OF FIRES. — The apparatus which is most promptly used in cases of burning buildings and also with the least efficacy, is the human voice, notwithstanding the historical fact that blowing has accomplished nothing since the days of Jericho. Yet there are numerous instances where fires have been extinguished through causes connected with their origin, and so completely outside of precedents that they serve as instances of the happening of the unexpected. In this connection we do not refer to the fires extinguished by automatic-sprinklers, where the result is clearly what has been expected to happen. Notwithstanding the fact that when a fire occurs on property protected by automatic-sprinklers, those present avail themselves of all the means of grace in the shape of the usual fire-apparatus at hand, yet there are numerous instances where fires have occurred at night or in rooms vacant at the time, where the fact has been made known only by water percolating through the floors, or the sound of the automatic fire-alarms, or from the sprinklers which have already come into active operation, the fire having called down means for self-extinguishment. But the instances which we have in mind are those where the means of extinguishment were not expected, as in the well-known Cathedral Building in Boston, where a fire, caused by spontaneous ignition in a store-room, melted the lead water-pipes, and the water issuing from them extinguished the fire. A similar instance happened in a building in Market Street, Philadelphia: some sheet-metal pails were returned by the purchaser to a tinsmith in Chester, Pa., with the complaint that they were not tightly made. The manufacturer resoldered them, and in order to test his work filled them with water and hung them upon hooks at the ceiling. While the men were at dinner during the noon hour, a fire heated the upper part of the room so that the bails connecting the handles to the pails became unsoldered, and the dropping of the pails of water dashed out the fire. Some waste left upon the top of a steam-pump at Watertown, Mass., blazed from spontaneous ignition, and this in turn set fire to the lagging around the steam cylinders and the feed-pipe, where it melted the soldered attachments of a continuous automatic oiler. The steam from the feed-pipe was discharged through the small tubes formerly leading to the oiler, and extinguished the fire. There have been numerous instances of fires which have ceased for want of air.

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During the war of the rebellion attempts were made to burn New York City, as the result of a conspiracy, fires being started in several hotels; but in order to prevent premature detection the culprits closed up the rooms so tightly that the fires were smothered. At an hotel in Woonsocket the steam-pipes caused a fire in the spaces in the walls of the building, which was extinguished for want of air to support combustion. The time of the fire is unknown, as its occurrence was not discovered until some time afterwards, when in the progress of an alteration to the building the facts were made apparent. It may be interesting to know that in this instance the steam-heating service was ordinarily used at a pressure of about 4 lbs. to the square inch during the coldest weather, and that the safety valve was so arranged that the pressure could never exceed 10 lbs. A spark of static electricity proceeding from a belt, ignited leaking gas and this in turn set cotton on fire, which operated the automatic sprinklers and extinguished it. An attempt was made to destroy a block of new dwellings at Brookline, Mass., before the buildings were entirely finished. Some people alarmed by the smoke which was seen in each division of the structure, rushed in to save doors and portable fixtures, when it was noticed that the fires did not appear to gain any headway, and when the smoke had entirely died away, it was found that the incendiary had placed lighted candles in sawdust and other inflammable material in drawers and closets, but with such limited supplies of air that combustion could not be supported and the fires became smothered. — *Engineering.*

The Biggest Flumes in the World. — The total length of the flume, when finished, will be thirty-five and three-quarter miles, and the thirty-fourth mile is now completed. The redwood came from Humboldt and vicinity, in Mendocino County. Redwood was used exclusively in the box of the flume. It was strictly clear selected redwood, without knots or sap. The work of the contractors began early in June of last year. On June 27 the first load of lumber was hauled out. An idea of the gigantic character of the work that has since been done can be gained by noting the number of animals and men that were employed. As high as 500 head of horses and mules have been in service at one time, being driven in eight and ten horse teams. During a good portion of the time sixty teams have been travelling back and forth hauling the lumber. Besides the teamsters from seventy-five to 125 men were constantly employed in the work of construction. With the yard hands and other helpers it is safe to say that 200 men were constantly employed in the various departments of the work. Mr. Carle estimated the amount of lumber used in the flume at 9,000,000 feet. This is a very conservative estimate, and in all probability considerable more was used. The vastness of this amount of lumber can better be impressed on the mind of the reader by some comparative statements. Had this lumber been all loaded on wagons at one time it would have required 3,000 wagons and 25,000 horses to haul it. The string of teams, if drawn into line one after the other, would make a procession over fifty miles long; the amount of lumber used in the construction of the flume would be sufficient to erect over 200 large two-story residences and would load nearly forty large ships. A tree that will yield 1,000 feet of lumber is a large one, and yet it would require 9,000 of such trees to furnish as much lumber as was consumed in building the flume. This number of trees, as can readily be seen, would make quite a forest. In the course of the flume there are 315 trestles, the longest of which is 1,700 feet in length and eighty-five feet high. Its construction required 250,000 feet of lumber. This is the Los Cochos trestle. The Sweetwater trestle is 1,200 feet long and eighty-five feet high. The main timbers used in these trestles are 10 x 10 and 8 x 8. They were put together on the ground and raised to their position by horse-power. There are eight tunnels in the course of the flume, the longest of which is 2,100 feet in length. The tunnels are 6 x 6 feet in size, with convex shaped roofing. Each mile of the flume required, on an average, 250,000 feet of lumber for its construction, and the redwood used in the box is all two inches thick. The San Diego flume is pronounced by men experienced in such enterprises to be the largest ever built in the world. So stupendous was the undertaking that at its conception many declared that it could not be built. Every obstacle has been now overcome, however, and by the 2d or 3d of September the last spike in the flume will be driven. The water will then be brought to the reservoir, about ten miles from San Diego, from which point it is proposed to pipe the water to the city. In regard to the mechanical work done in the construction of the flume, all who have examined it declare that it is first-class in every particular. Engineers have fixed the grade every mile in order as near as possible to insure perfection in that important particular. The flume has a uniform grade of four and seven-tenths feet to the mile. An idea of the difficulties that have been overcome in the construction of the flume may be gained from a consideration of the fact that much of the lumber had to be drawn 700 and 800 feet up the sides of steep and rocky mountains. The lumber was loaded on cars that ran on a portable track. The cars were attached to a heavy wire cable. The motive power was furnished by a portable cable engine. The flume is now completed, and as the work of laying the pipes from the reservoir is comparatively an easy one, it will not be long before the water from the great flume will be flowing into our city. — *The San Diego (Cal.) Sun.*

Recovery of a Long-lost Tapestry — "When Marguerite of France was married to Victor Amadeus of Savoy, she took with her to Italy twenty pieces of the very finest Gobelins tapestry, illustrating classical legends," says *London Truth.* "This unique tapestry, which was of immense value, disappeared mysteriously when Napoleon invaded Italy, for it had been hidden away in case the French might think proper to carry it off, which they would certainly have done. It had been so carefully concealed that, after some years, when calm was restored, it was found impossible to discover it, and the two officials who had put it away were both dead. The tapestry had been almost forgotten till about a month ago, when the Marquis Villamarina, the master of the royal household, was making a thorough investigation of the palace at Turin from roof to cellar, and behind some huge chests in a storeroom in the highest story he found a secret chamber, in which was concealed the long-lost tapestry, and it had been very little injured by its hundred years of hiding. King Humbert has ordered that the tapestry is to be carefully repaired and cleansed, after which it is to be sent to Rome and hung in the Quirinal in the apartments which the Emperor William is to occupy during his visit next month."

TRADE SURVEYS

There is a growing sentiment in financial, business, railroad and manufacturing circles that the tariff question ought to be taken out of the domain of politics as soon as possible. The tariff question is or ought to be a matter purely of business. Politicians have seized upon it to make ammunition, and they are making the most of it to the detriment of the business interests of the country. The question has been broached involving the possibility of creating some sort of a commission which would be a permanent body which should investigate thoroughly into the merits of all tariff legislation, and to make reports to Congress from time to time as to what changes are desirable. Such a commission going into and investigating the commercial necessities of the country, we would naturally suppose to be better able to decide upon tariff matters than can possibly be done in Congress where the business interests of the country are made the foot-ball of politicians. The defeated party will, no doubt, prepare itself after the election to renew the contest. Inquiry among capitalists, large manufacturing interests and railroad interests show very clearly that there is a large amount of capital that is held back till some solution is reached through investigations that their interests will not be tampered with by home or outside agencies. There is a large amount of capital from abroad anxious to seek employment on this side. The success of the copper syndicate has done much to attract attention this way. The success of our own syndicates and trusts in cornering products, and in forcing up prices, has been drawing the attention of foreign capitalists to the advisability of taking their money and putting it where from 75 to 100 per cent can be realized. There is one point worth alluding to; namely, the probability of a speculative craze in this country. It is the natural outcome of the compact organization of business interests. It will seek activity in landed operations and in securing control of mining property. Several schemes are under contemplation looking to the securing of control of a large amount of at present comparatively valueless territory in the arid regions of the West. Representatives of foreign moneyed concerns are now making a careful investigation and a sort of inventory of resources of mining properties and mining resources all through the Southwest. There will be some large purchases made with the assistance of foreign capital which will lay the foundation of something like a monopoly. A large amount of idle capital is obliged to seek some points where its employment will be permanent. Many economists are inclined to look upon this tendency as fraught with danger. However this may be there are a number of important advantages to be secured, and in one respect a great flow of capital into the producing interests here. Reports from nearly all commercial centres show that money is in good supply. Rates are stronger partly in sympathy with the advance in rates in the Bank of England. There is nothing to indicate the probability of a scarcity of money for all legitimate business purposes. Leading railroad stocks have gained in strength. Manipulators are endeavoring to stimulate a bull movement that has manifested itself here and there. The outside public are nibbling and the insiders are rolling out every possible bait they can. The increasing volume of traffic is working in their favor. The general advance in freight rates will strengthen confidence not only in railroad bond purchasing, but in the belief that there will be more than a moderate revival in railroad-building within the next six months. The organization of a good many railroad properties is in progress. Leases are being made, extensions are being entered into and affairs between the Western and Eastern trunk lines are assuming a more harmonious attitude. Railroad builders themselves are formulating plans looking to the building of some important enterprises early next year.

The iron trade has retained the strength which it has been quietly accumulating since September 1st. Prices of crude iron have advanced from fifty to $1.50 per ton. Merchant iron has gained about $2.00 per ton and all kinds of mill products are higher in price. The coal trade is exceptionally active. The anthracite production is 2,700,000 more than at this time last year. The bituminous production from sources which mainly supply the markets along the Atlantic Coasts was this year 8,990,211 tons as against 758,846 tons last year. The anthracite production this year over last will be about 3,500,000 tons. The Reading Company has spent $1,700,000 in improving its mining properties. This company is now about constructing an enormous depository for coal in the heart of the coal region, which will enable it to accommodate requirements in the case of unavoidable suspension of production at the mines. A great deal of new bituminous coal territory is being opened up and in the far West a large number of orders have been worked up. There will be a great saving of freight rates in the far West and in the South from the supply of coal from local deposits. This increase in the supply of fuel will mark an era in the development of small manufacturing interests, which for years have been held in check by the impossibility of securing cheap coal. The car-building shops of New York, Pennsylvania and Ohio and one or two Western States have been pretty well loaded up with orders within the past thirty days. Railroad managers contemplate the placing of very heavy orders for cars, gondolas for cars of all kinds. The new car-building shops and railroad shops in the Southern States are booking orders at the rate which authorizes an increase of car-building capacity next year. The managers of several Southern roads are now negotiating for the construction of several large machine-shops, and steps have been taken for the establishment of a locomotive works at some point in the South. Trade combinations have gone very far to wipe out the extremely low prices on staple goods. The textile manufacturers of New England are still leading. Foreign importations are threatening. Southern textile mills are paying good dividends. Cotton planters hold to their stocks in the Northwest and similar satisfactory conditions exist among the cultivators of the soil. They will hold their ground for the very best possible prices that they can realize. Speculators will probably not attempt a cornering of the crop. The wheat victory, notwithstanding the advance it has caused in retail markets throughout the country, brings with it some compensating advantages. There is an improving tone generally throughout the manufacturing interests. Any further anticipation of wants will most likely lead to a slightly higher range of prices. Manufacturers themselves desire to avoid this advance. Margins are now fair, but not high enough to stimulate additional investments in channels of production.

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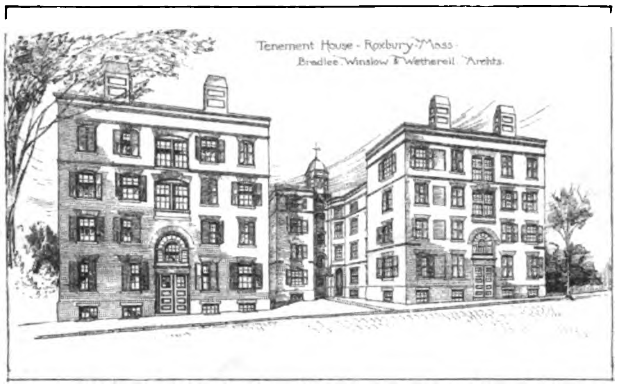

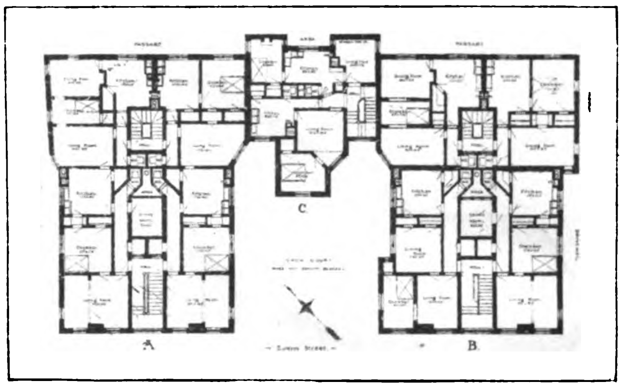

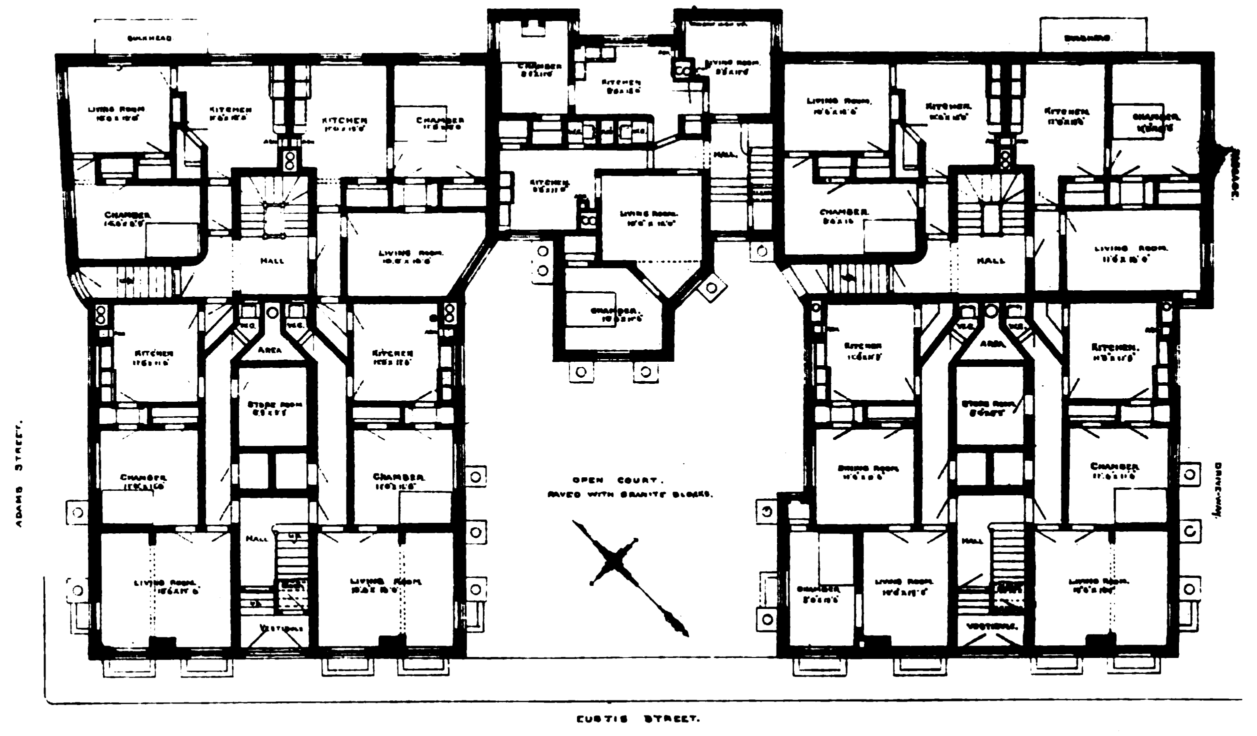

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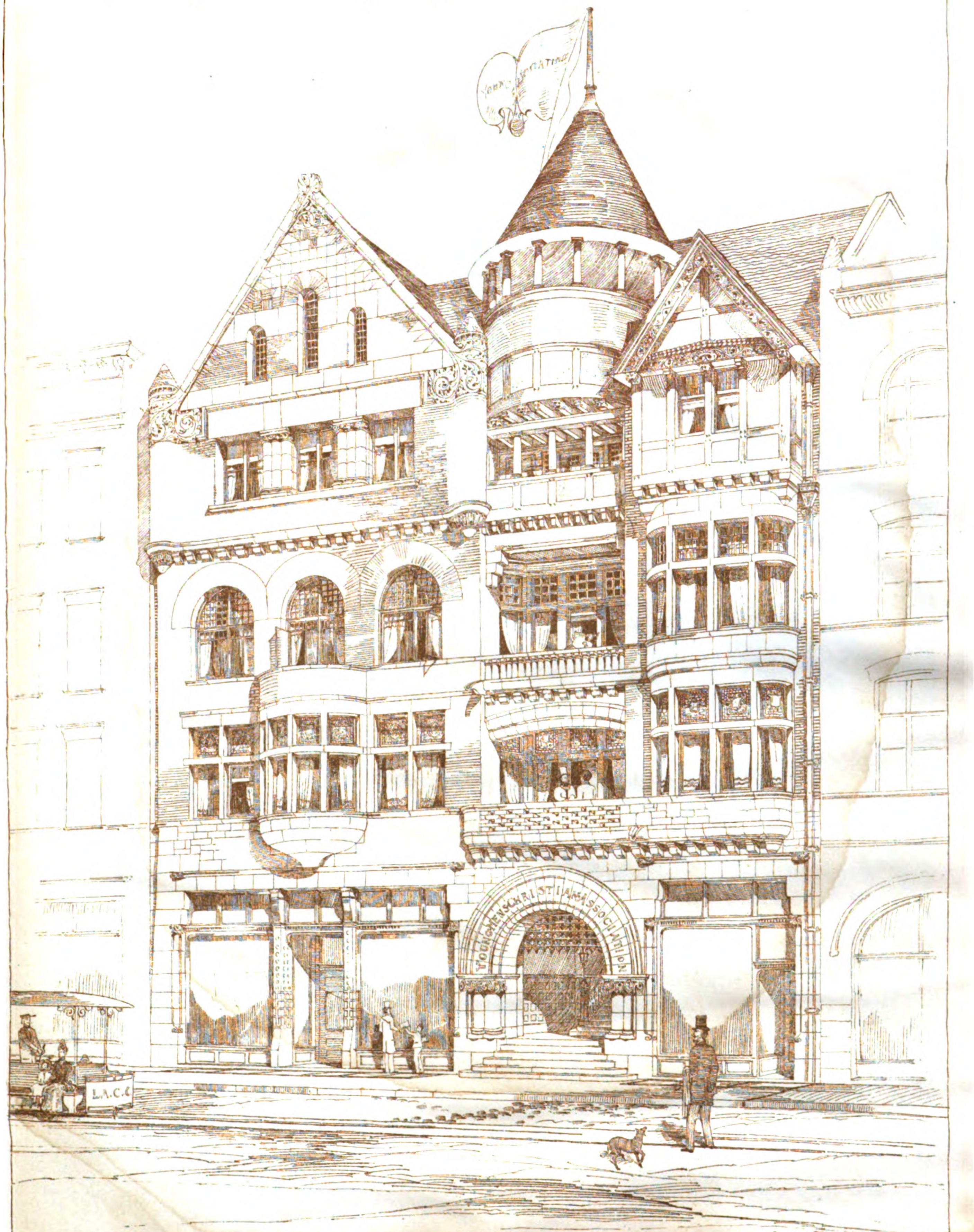

Ernest A. Coxhead delt.

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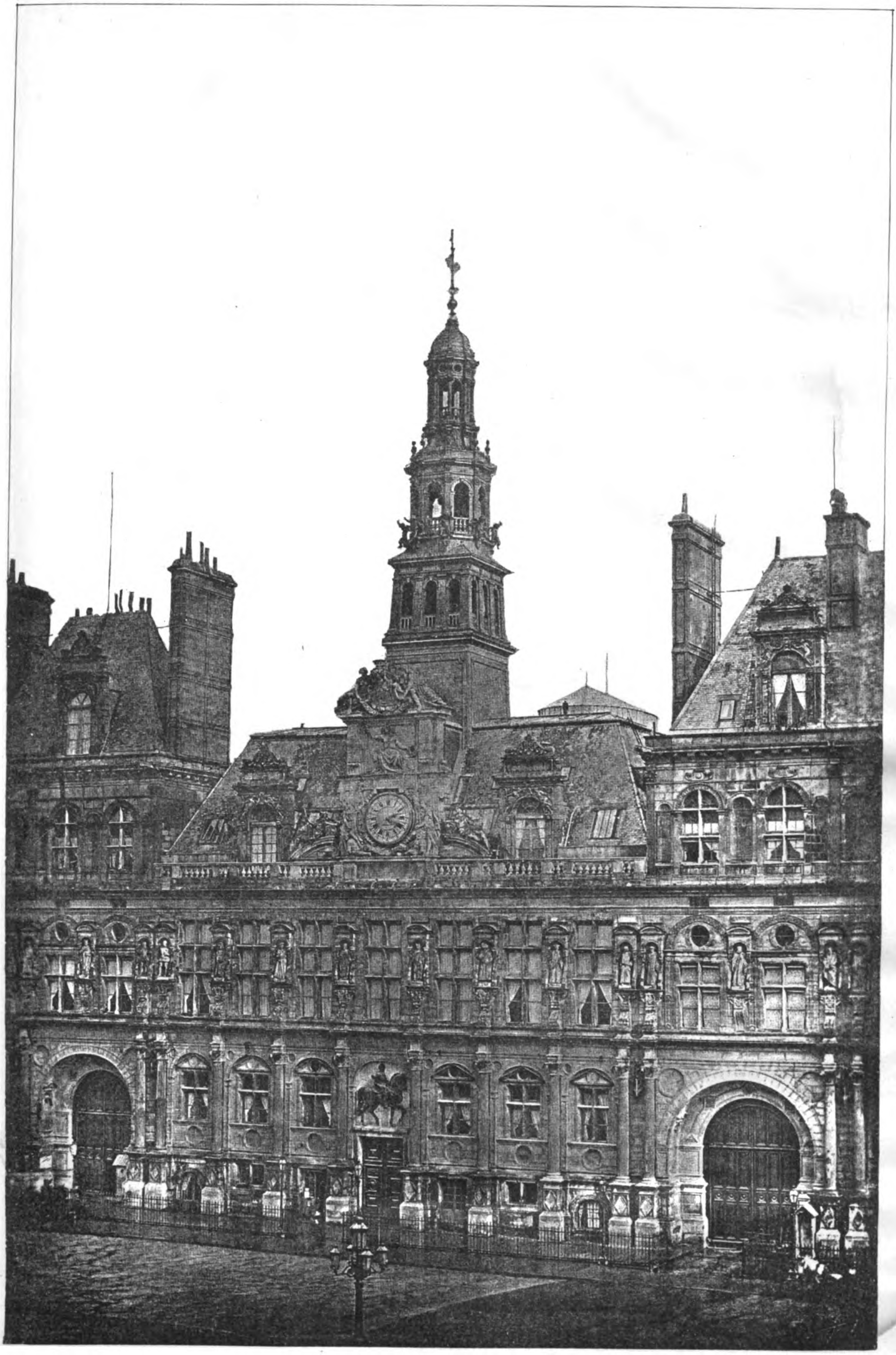

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THE HOTEL DE VILLE PARIS.
BEFORE THE COMMUNE.

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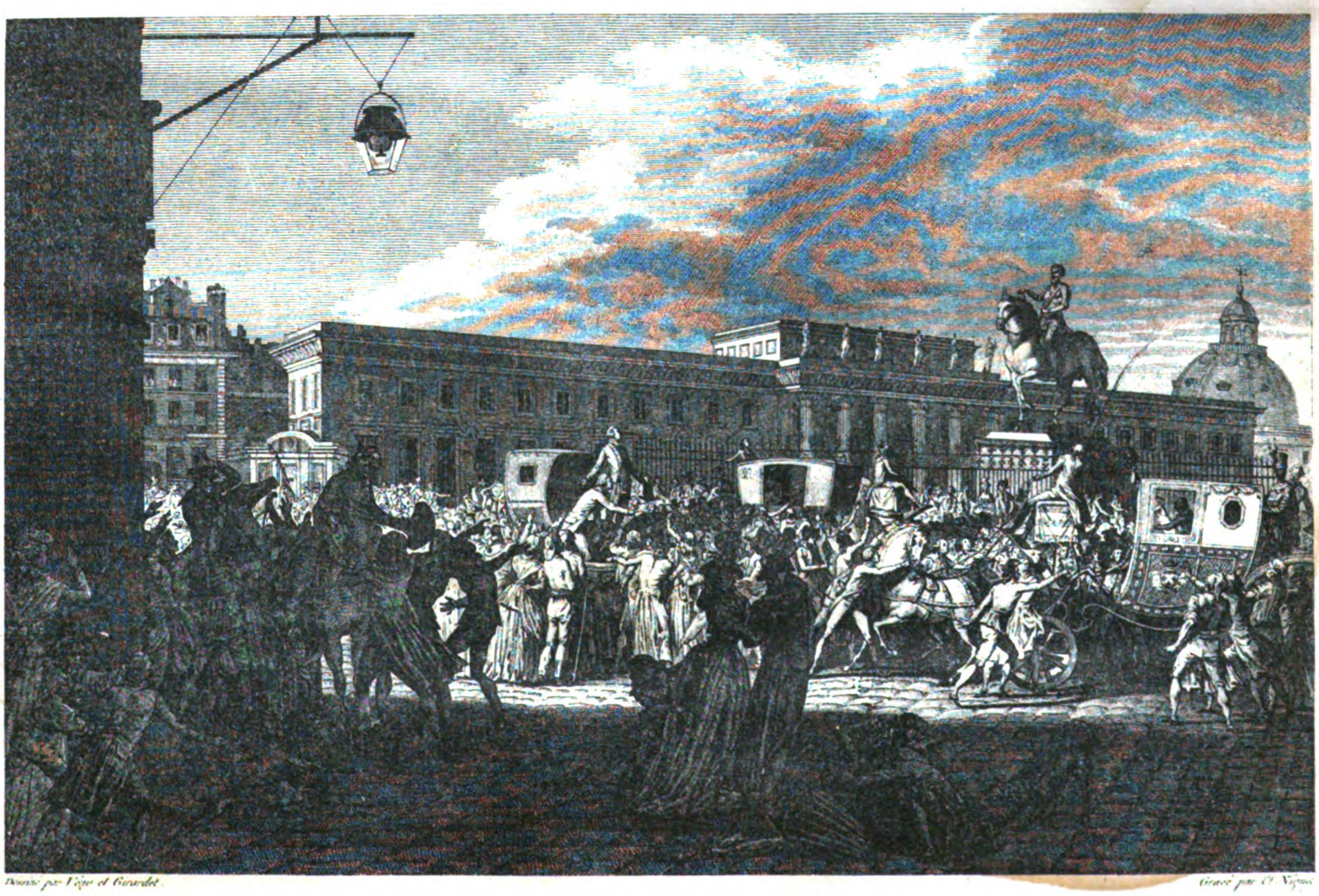
INCENDIE DU CORPS DE GARDE SUR LE PONT-NEUF.

Le 29 Aout 1788.

Cet Incendie eut lieu à l'occasion d'une Rixe qui se passa entre le Peuple et le Guet à pied et à Cheval, qui le chargea sur les Trottoirs des deux Quais. C'est alors que le Peuple se vengea en mettant le feu au Corps de Garde. Il brula sur la place Dauphine l'effigie des Minis.tres Brienne et La Moignon. On forma un Bucher avec les Guérites et autres dépouilles des differens Postes de la Garde du Guet, et des Claies des Marchandes de Volaille du Quai des Augustins ou de la Vallée.



Dessiné par Vèze et Girardet. — Gravé par Cl. Niquet.

RASSEMBLEMENT SUR LE PONT-NEUF,

Le 16 Septembre 1788.

Depuis plusieurs jours le peuple se rassembloit sur la place du Pont-Neuf. Il faisoit saluer et crier à genoux les passans devant la Statue de Henry IV

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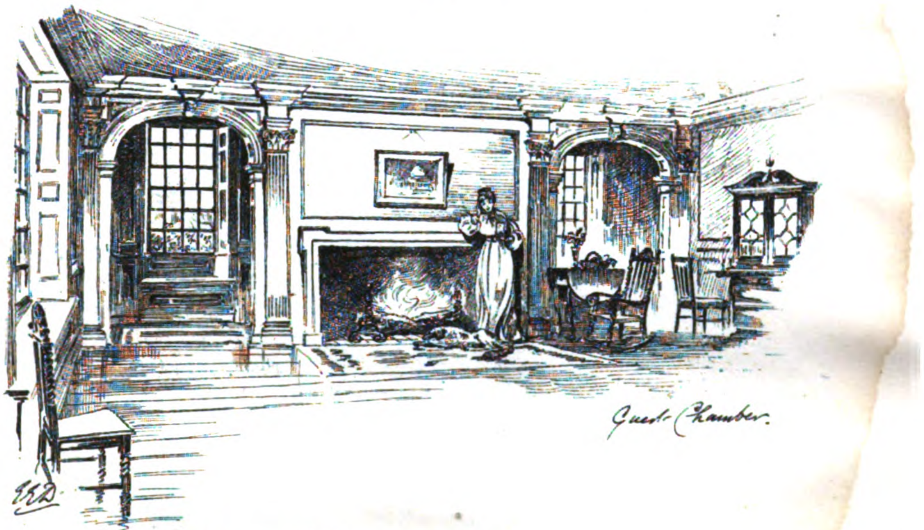
The old : Royall Mansion : Medford : Mass :

Court-Yard Front.



Guest Chamber.

Garden Front.

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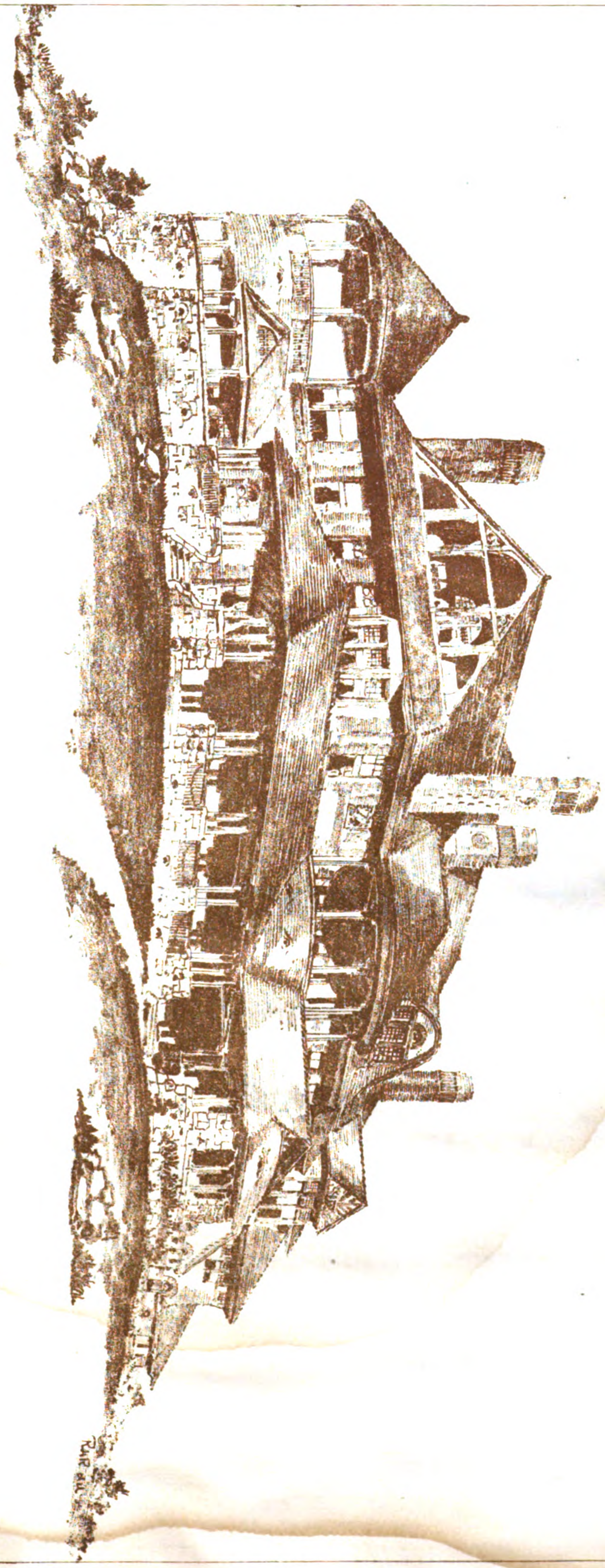

Design for Country House R. H. Robertson, Architects

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THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIV. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 669

OCTOBER 20, 1888.

Entered at the Post-Office at Boston as second-class matter.

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THE *Sanitary News* gives the substance of Dr. Edwin Chadwick's recent address before the Association of Sanitary Inspectors of Great Britain, which contains much food for thought. One point which is particularly noticeable in this, as in most other reviews of the progress of sanitary science, is the certainty with which the death-rate can be diminished in a given locality by well-known sanitary measures. As an illustration of this, Dr. Chadwick recalls the rigid system of inspection and disinfection adopted in England in 1881, when the cholera had gained a foothold there, and points out that, judging from the effect of the pest in Sweden, which had then a normal death-rate lower than that of England, but which took no effective precautions against cholera, the saving to England must have been at least fifty thousand lives. Since then, more experience, and larger authority, have enabled sanitarians to show the result of their efforts in the general death-rate, which, for England and Wales, has fallen from twenty and five-tenths, in 1880, to eighteen and eight-tenths in 1887. According to Dr. Farr's tables of the average value of lives, the saving in money to the kingdom effected in this way now amounts to nearly forty million dollars a year. Much more remains to be done. It is obvious that the country villages and smaller towns, which have not yet come under the sanitarian's authority, do, as yet, nothing to reduce the average death-rate, and even in the cities the work of sanitation is hardly more than begun, but the hopefulness of the prospect may be judged from the fact that in London, where not long ago the death-rate was twenty-four per thousand, it was last year fourteen or fifteen. Dr. Chadwick modestly says that he cannot ascribe so great a gain to sanitation alone, and thinks that it must have been due in part to climatic causes; but the fact remains that there are living to-day in London thirty-six thousand persons who would have died during the year under the old conditions. To show the full significance of this, we will imagine the death-rate of Great Britain to be now the same as that of London twenty years ago, and assume that the population under these circumstances remains stationary, the births just making up for the deaths. Supposing a sanitary reform to be instituted which reduced the annual death-rate, as in London, from twenty-four to fifteen in the thousand, it is easily shown that this saving of life alone would double the population in about fifty years.

POLITICAL economists are not agreed whether this would be an advantage to Great Britain or not, but there is no doubt in regard to less densely settled countries. In France, for instance, where the population is rather diminishing than increasing, the Government, as an encouragement to early marriages and large families, now offers to educate at the public expense the seventh child in every family. This may have some effect, but, to judge from Dr. Chadwick's figures, the money spent in this scheme, if used in abolishing the cesspools and "fosses" of Paris and other French towns, and in administering soap and water to the inhabitants of the villages, would increase the population, by saving French lives, more in a year than the seventh-child device would do in a decade. So closely connected are cause and effect in these matters, that Dr. Chadwick suggests that an experienced sanitarian might make a contract for the reduction, for instance, of the death-rate of Manchester, which is now twenty-seven in the thousand, to sixteen per thousand, receiving suitable concessions in the way of permission to build sewers and disinfect houses. The city would gain enormously by such a contract, not only in the saving in population, but by the increased health and ability to labor of all citizens, while the contractor might, Dr. Chadwick thinks, do the work at a profit for a compensation amounting to not more than one-third the premiums annually paid for insurance against sickness and death. This is not, perhaps, so impracticable a scheme as might appear. It would probably be difficult to adjust the methods of making payments to such a contractor, or to persuade the life-insurance companies to allow anything from their premiums toward paying him, but there is no reason why the life-insurance companies should not do the work themselves. A great change has recently come over the methods of fire insurance in this country, the underwriters now in many cases making earnest efforts to examine and classify risks, to suggest measures for preventing fires, and to keep the premises they insure under careful inspection. They will undoubtedly be well repaid for their trouble, and the life-insurance companies might easily imitate them. After a policy-holder in a life-insurance company has been examined and accepted, it would not be very difficult, or extremely costly, to keep the place where he lives under inspection, to suggest sanitary improvements, and, on occasion, apply disinfectants, or use other means to avert danger. The list of preventable diseases is already long, and is growing longer, and a study of the modes of attacking them, with practice on occasion, is as legitimate for a life-insurance company as the maintenance of a patrol, or a provision of waterproof covers, is for the fire companies. Moreover, a life-insurance company which interested itself sincerely in the health of its policy-holders would gain greatly in popular notice and confidence. However willing a business man may be to sell his own insured stock to the underwriters, no one over-insures his life, or tries to defraud the insurance companies by dying. On the contrary, the interests of insurer and insured are here identical. The insurance companies wish all their policy-holders to live to extreme old age, and the policy-holders are not only quite disposed to do so, but will be grateful for all the warnings, suggestions and advice which the properly qualified experts of the companies may offer to promote the object which both parties desire. What would be the profit to the first insurance companies to carry out such a plan may be inferred from the fact that a reduction of the death-rate, such as has been easily effected by sanitary measures in large towns in England, corresponds to an addition of five years to the average length of life. Supposing that life-insurance policy-holders pay, as an average, twenty years' premiums, which we imagine to be rather over than under the truth, a lengthening of the average life of policy-holders to the extent of five years would mean an increase in premiums received of twenty-five per cent, and an increase in profits of at least twice that amount.

THE *Wiener Bauindustriezeitung* is strongly in favor of painting the outside of brick or stone buildings, as a means of repelling dampness from them. It acknowledges that many scientific persons oppose the painting of walls of masonry, on the ground that ventilation through them is thus prevented, but it believes that where the transfer of air through the walls exists, its value is more than counterbalanced by the facility with which the masonry becomes saturated with moisture. In support of its observations, it cites the example of two houses, standing side by side, facing the rainy quarter of the compass. One of the houses has the front painted in oil; the masonry of the other is left bare, and after a heavy rain is almost black with the water which it has absorbed. In this house dwells a family of persons not constitutionally subject to rheumatic or

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pulmonary complaints, or catarrhs, but since taking possession of the building every member of the family and inmate of the house has been ill with rheumatism or catarrhal affection; while the dampness of the air in the rooms is indicated by the peeling off of the paper from the walls, and by the persistent smell of tobacco-smoke, a certain sign, we are informed, of a moist atmosphere. The painted house is inhabited by a family of consumptive tendency, yet no member of it, or other inmate of the house, has suffered from pulmonary or rheumatic disease, although, after a very heavy and continued rain, the cellar has been flooded with water. So far as ventilation by open windows is concerned, the two houses have been similarly treated, and the only difference between them appears to consist in the paint on the outside walls.

THE same useful journal also mentions a device for keeping walls dry which may be of value. Where a brick wall, plastered on the brickwork like all walls in Vienna, shows dampness on the inside, after being exposed to rain, the plastering should be removed, the mortar scraped out of the joints of the brickwork to the depth of half an inch, and the whole then painted over with hot coal-tar or asphalt. After this is hard, a new coat of plaster may be spread over it, and finished as if there were no coal-tar under it. If the new plaster should not adhere to the asphalt, as often happens, a rough surface should be given it by throwing sand over it while the asphalt is still warm, or, we might add, by throwing hot sand at it even after the coating had become cold and hard. This gives a texture to which a hard-finish, or other second or third coat of plaster will cling indefinitely. If coal-tar is used, with ordinary plaster over it, the disagreeable smell of the coal-tar or asphalt will come through the plaster coat into the room, but this may be prevented almost entirely by mixing the plaster with cement or hydraulic lime.

THE Massachusetts State Board of Health once made an investigation into the effect of the construction of dwelling-houses on consumption, and found that the proportion of consumptive patients was greatest in stone houses, and next in brick houses, and that it was smallest in wooden houses. Dry as our climate is, therefore, it is by no means impossible that paint might with advantage be applied more to masonry with us than it now is. A hundred years ago it was fashionable to paint brick buildings white, and many charming old structures remain to attest the value of the coat of paint in preserving the masonry, and its pleasant and homelike effect as a foil to the vines and shrubs with which even city houses are now commonly adorned. If it should prove, as might easily be ascertained, that the painted brick houses preserve their inhabitants more effectually from sickness and premature death than the unpainted ones, it would be worth while to revive the ancient fashion, and, with our greater resources in the way of materials and ideas, exterior coloring might become as important an accessory to the architecture of the twentieth century as it was to that of the twelfth and thirteenth.

WE have received the announcement for the coming season of the Art Schools of the Metropolitan Museum of Art, which are to be, as before, under the management of Mr. Arthur Lyman Tuckerman. Mr. Tuckerman, in addition to the general supervision of the schools, conducts the courses in Architecture, which are so arranged as to prepare pupils, who desire it, in three seasons for admission to the Ecole des Beaux-Arts in Paris. For those who wish only to perfect themselves in drawing, design and mathematics, while regularly engaged in offices, lectures and exercises are arranged to occupy only one-half of each day. Besides the courses in architecture, the schools provide classes in elementary drawing, painting and drawing from the antique and the round, as well as from the life, and in modelling and sculpture; any or all of which the young architect might pursue with great advantage. The instruction is the best that can be obtained in New York, the hours are divided between forenoon, afternoon and evening, so as to accommodate as many persons as possible, and the cost of tuition is extremely moderate, the fees for the whole course in Architecture being but twenty-five dollars for the school year, while those for the evening classes in drawing and modelling are fifteen dollars each; and in the School of painting, which is under Mr. Cleveland Coxe, the price is thirty-five dollars for daily instruction, either morning or afternoon, during the school year, or forty dollars where pupils attend both the morning and afternoon classes.

WE are so pertinaciously called upon by politicians to wonder and rejoice at the extreme prosperity of our own country that it does not often occur to us to look about and see whether any of the nations which live under a less admirable government ever dream of emulating American enterprise and development; and if any of us happen to notice a foreign undertaking, such for instance, as the Trans-Caspian Railroad, and to observe that it is intended to be about five times as long as our Pacific road, and has been built about four times as fast, he is so frowned upon and decried by the professed mouth-pieces of public sentiment that he finds it safest to keep his eyes fixed upon the unapproachable material felicity which he and his neighbors are supposed to be enjoying at home. For all this, there is instruction to be derived by sensible men in looking abroad once in awhile, and it is curious that, whereas America was once the chosen land of "booms," real estate speculations, and mushroom towns, while Europe was all conservatism and fixity of values, the conditions are now rapidly changing, and while land throughout most of the United States is stationary or retrograding in value, Europe is full of real estate "booms" and speculations, and towns spring up and grow with a vigor rarely approached here. To say nothing of the extraordinary transformation of the desert around the Caspian Sea, which followed the development of the ancient Baku oil-wells by the Nobel Brothers, many other portions of Russia, Germany, France and England are rapidly outgrowing the geography. The Black Sea, particularly, in the changes which are taking place on its shores, reminds one of our own lakes, with their great ports of internal commerce. Odessa, which now attracts attention alternately to the ferocity of its Christian inhabitants, its fondness to anarchist plots, and its great commercial importance, was, ninety years ago, a miserable little Turkish village, with a few hundred inhabitants, but no harbor or shipping. Now it has a population of two hundred and fifty thousand, and four thousand vessels enter its port every year. Its harbor, famous as it is, is almost purely artificial. A century ago the indentation of the coast on which it lies was open to all winds from the southeast to the northeast, and the waves driven by the southeasterly wind, which is the most violent one in the Black Sea, swept the bay from end to end. In 1794, under the Empress Catherine, the first stone was laid of a small breakwater at the southeast corner of the bay. The work went on slowly and roughly, but every stone added to the mole gave shelter to a few more inches of harbor, and traffic kept pace with the safeguards provided for it. Improvements were demanded, and made, one by one, until now the southeast mole has become a magnificent work, one hundred and forty feet wide and nearly two miles long, with stone pavement, cut stone revetment on both sides, and a high stone parapet on the side toward the sea. This, however, is but a small part of the engineering which has made the present harbor of Odessa. At the opposite extremity of the city another mole projects about half a mile northeasterly into the Black Sea, then turns, forming nearly a right angle, and continues until it nearly meets a third mole, projecting straight northeasterly from the shore, inclosing a basin; and two more moles of less length divide the water-front of the town into four distinct harbors, all protected from the southeast winds by the great Quarantine Mole and its extension, and from the east and northeast by a work hardly less important, the huge breakwater, a mile long, which completely shelters the entrance to the harbor, leaving only a narrow, protected entrance at each end.

IT seems that the Keely motor, which, after a very profitable experience of several years in this country, suffered, a few weeks ago, a cruel blow in the shape of a mandate from court requiring that the principle of its operation, or non-operation, should be explained, has sought consolation for this injury abroad, where its manœuvres in connection with its shareholders' pockets can be carried on without interference from Pennsylvania courts. Singularly enough, the first announcement of its appearance in France couples it with Commandant Renard's balloon, which it is said to have made perfect by supplying the necessary motive-power; but we do not find that any one has yet seen the motor driving a balloon through the air, and imagine that many French stockholders will bleed severely at the pocket before this anticipation is realized.

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BUILDERS' HARDWARE.[1] — IX.

SPECIAP HINGES.

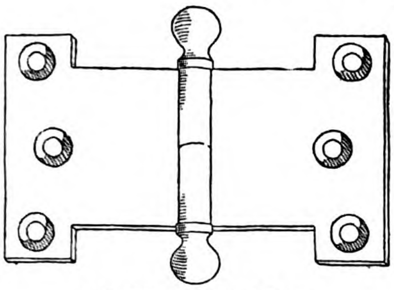


Fig. 88. Parliament Butt.

PARLIAMENT-butts are shaped like Figure 88. They are intended to be used on very thin doors or shutters where considerable space is needed for the screws. They are made in several varieties of design and finish. Figure 89 is a hinge used almost exclusively for wash-trays. Figure 90 is a form of chest hinge somewhat similar to that shown by Figure 67. There are also several forms manufactured for hanging inside-blinds. Figure 91 is the common form for ordinary blinds in two folds. The same is made with either fast or loose pin, and there are several varieties with ornamented surfaces. They are more specifically designated as "shutter flaps." Figure 92 is a form of shutter-hinge used for shutters which fold back over each other, as shown by the cut.

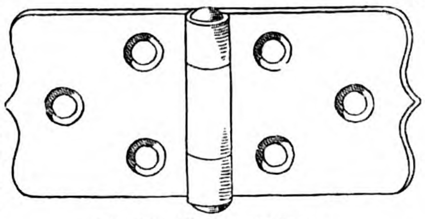


Fig. 89. Wash-Tray Hinge.

Figure 93 is a hinge which is very convenient to use for water-closet seats, double-hinged lids, etc., the central flap being screwed to the seat, while one of the outer flaps serves for the seat cover and the other is attached to the frame at the back.

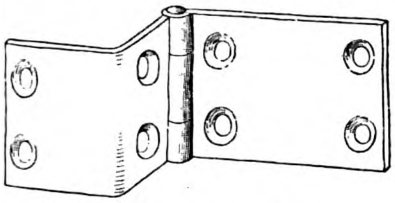


Fig. 90. Chest-Hinge.

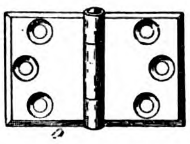


Fig. 91. Inside Blind-hinge.

Figure 94 is a pivot or centre hinge to go underneath and above a door. Figure 95 is used for much the same purposes. Figure 96 is a form of wardrobe hinge. Besides these there are many special forms of hinges used in connection with furniture and a few for more strictly building purposes, none of which, however, are of any special value or interest, except the hinges used for double-acting screen-doors, that is to say, doors which swing both ways. Most of these are fitted with springs and will be considered later on, but the form represented by Figure 97 is peculiar to itself. It is rather hard to appreciate it clearly from the drawing, but the sectional plan will make the arrangement more easily understood. The figure shows the hinge as it would appear when opened out. It really consists of three separate double-acting hinges, each as shown by the plan. A similar hinge is made with two sections instead of three.

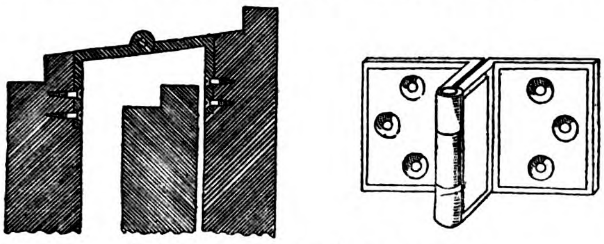


Fig. 92. Three-fold Shutter Flap.

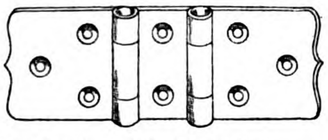


Fig. 93. Water-Closet Seat Hinge.

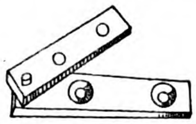


Fig. 94. Pin or Centre Hinge.

[1] Continued from No. 668, page 168.

Figure 98 is even more puzzling, at least, no drawing can illustrate it clearly, though the thing itself is easily understood. Its action is on exactly the same principle as Figure 97. The curved connecting pieces are between the two main hinge plates when the door is shut. For clearness the hinge is shown both in sections and put together. If the plate *C* be fastened the door frame, when the door is opened towards the left the plates *D* and *B* will revolve together about the axis 1, 1, taking the position shown by the figure. If, however, the door is opened in the contrary direction, the revolution is about the axis 2, 2, the plates *D* and *A* turning together.

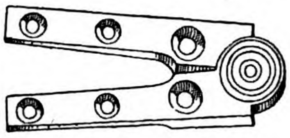


Fig. 95. Quadrant Hinge.

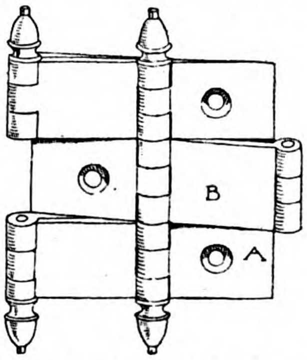


Fig. 97[1]. Screen-Butt. A. G. Newman.

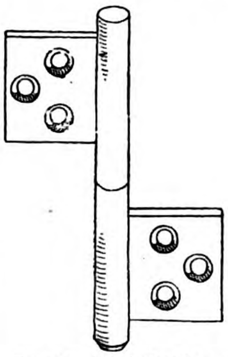
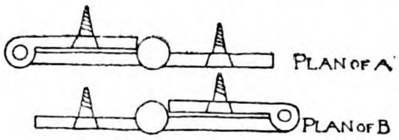


Fig. 96. Wardrobe Hinge.



97[2]. Screen Butt.

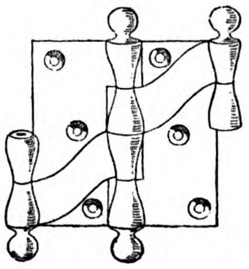


Fig. 98. Screen Butt.

SPRING HINGES.

One of the simplest forms of spring hinge is that shown by Figure 99, consisting of a single spiral coil spring about a hinge pin, so arranged than when the door is opened the spring is twisted more tightly, and by its resistance tends to close the door. The lower flange is secured to the door frame, and in setting the hinge the spring is brought to a proper tension by turning up the hinge pin, holes being pierced in the bottom of the pin, as shown, to facilitate the use of a lever, while a shoulder, dropped into one of the holes, bears against the fixed flange and prevents the spring from uncoiling. Figure 100 is

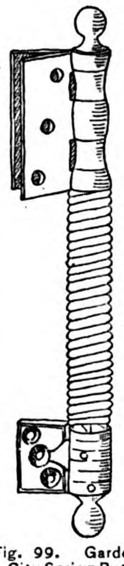


Fig. 99. Garden City Spring Butt. Chicago Spring Butt Co.

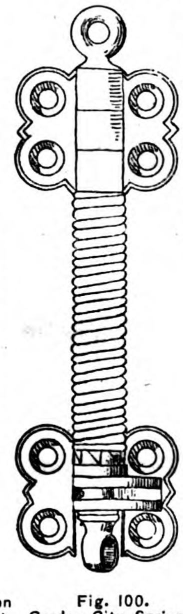


Fig. 100. Garden City Spring Butt. Chicago Spring Butt Co.

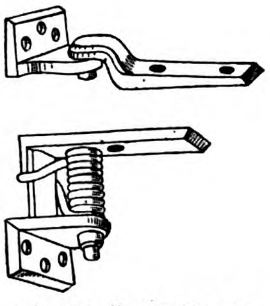


Fig. 101. Keene's Double-acting Saloon-Door Hinge. Chicago Spring Butt Co.

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a spring hinge to be planted on the face of the door and the door frame, the spring being turned up by using a bar in the hole through the bottom of the pin, and kept from uncoiling by the ratchets shown in the lower portion. Both of these hinges are for single swinging doors.

Figure 101 is a light form of double-acting spring hinge suitable for fly doors which are set up from the floor, and do not extend to the top of the door frame. Its action will be readily understood by reference to the figure.

Figure 102 represents a double-acting spring butt of the same general form as the single-acting butt, Figure 99. The springs are turned up and secured in essentially the same manner and the appearance is the same. This form really embodies the principles of nearly all the varieties of spring hinges, the differences being in appearance and in compactness of construction rather than in the workings. Two styles, the "Empire" spring hinge, Figure 103, and the "Star" spring hinge, Figure 104, will fully serve as types of a great variety of double-acting spring hinges listed in the catalogues of the various manufacturers. In the "Empire" spring hinge the coiled springs are exposed to view, and are tightened by inserting a lever in the cogs at the bottom of the hinge and drawing it around until the catch *A* on the top of the hinge pin is held by a little projection on the hinge plate. In the "Star" hinge the springs are encased, though they are set up in essentially the same manner. Both these hinges are excellent of their kind and are about as good as anything in the market.

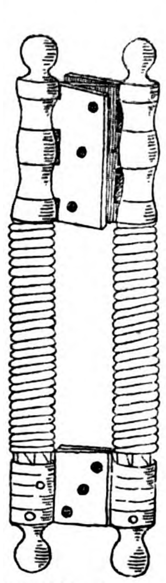

Fig. 102. Garden City Double Acting Spring Butt. Chicago Spring Butt Co.

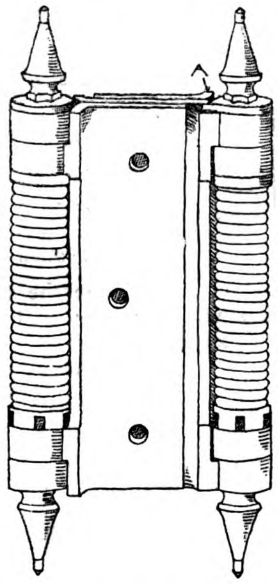

Fig. 103. Empire Spring Hinge. Van Wagoner & Williams Co.

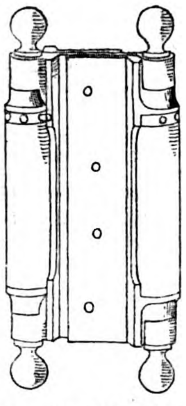

Fig. 104. Star Spring Hinge. Van Wagoner & Williams Co.

Figure 105 shows the "Crown" hinge, a form which permits of a little nicer adjustment than the others in that the ratchets about the spiral spring are quite close together and the tension can be increased to any desired strength. This is a strong and durable hinge, although none of the foregoing hinges should be used for outside work, as they are liable to rust and clog.

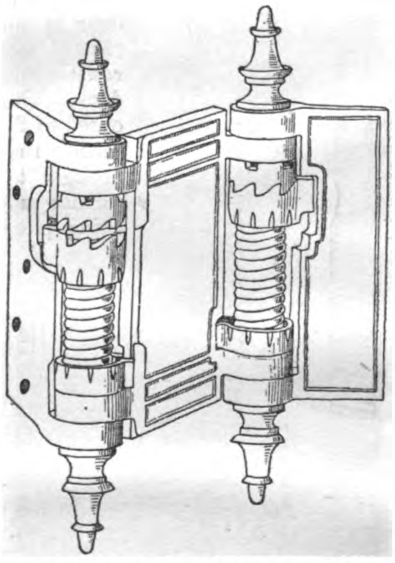

Fig. 105. Crown Spring-hinge. Van Wagoner & Williams Co.

All of the preceding double-acting hinges necessitate two coil springs. Figure 106 shows a form of double-acting spring butt in which the force is derived entirely from a single strong coil, which is concealed when the door is closed, working in the thickness of the door. This hinge has generally proved very satisfactory in use and is much called for, being very neat and tidy in appearance, and it is especially adapted for light interior doors, where it is desirable that the hinges shall be as inconspicuous as possible.

The simplest double-acting hinge, however, is the "Champion" spring hinge, shown by Figure 107. This is about as convenient and satisfactory a door-spring as is in the market, consisting of a single spring operating for either swing of the door. A catch on the hub of the lower jamb plate resists the door in one direction, while a corresponding catch on the upper plate resists the tension in the opposite direction. These hinges look neat in place and are very easily applied, and, having no complicated machinery about them, are not likely to get out of order.

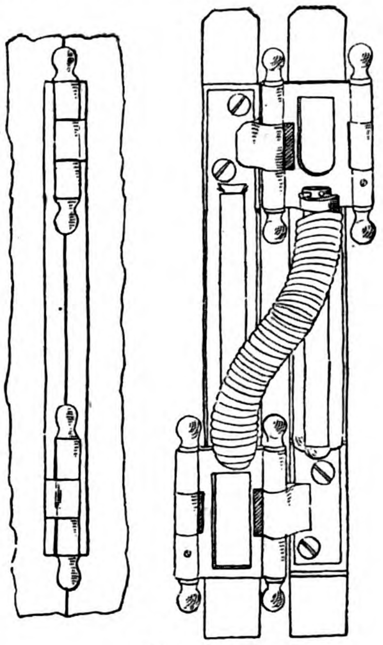

Fig. 106.

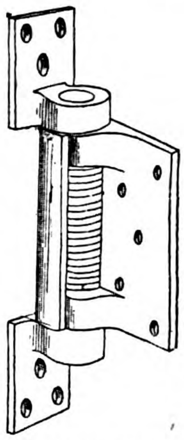

Fig. 107. Champion Spring-hinge. Chicago Hardware Co.

A hinge which has the appearance of considerable complication is the Jewett spring butt, shown by Figure 108. This butt, however, has many excellent qualities. It consists of four separate springs, two on each side. It will be seen by the plan that when the door is opened the tension is brought on the springs by aid of the push-bar or pin, A, which fits on the shoulder between the two springs and on a ratchet attached to the central hinge-plate. The springs can easily be released from their tension without taking off the door, by simply removing the push-bar, and, owing to the manner in which the springs are attached, they exert their greatest power when the door is closed, the force gradually decreasing as the door is opened. Another good quality is that, as there are four springs, if their combined power is too great for the door, any one of them can be released singly, without affecting the action of the others, and the tension of the spring brought to any point. It is also possible to replace a spring without taking the butt off the door, something which can be done with very few other makes. The only objection to the hinge in our mind is that it is complicated in its appearance and also that the springs are held in place by a moveable push-bar, which, under some circumstances might be knocked out of position and lost, in which

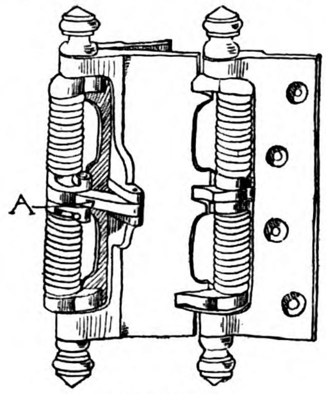

Fig. 108*a*.

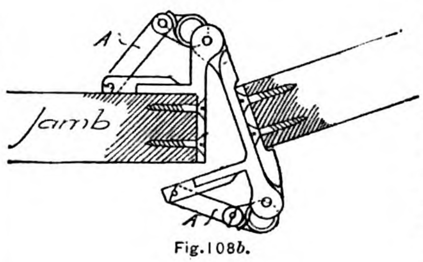

Fig. 108*b*.

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case the hinge would be practically useless. On the whole, however, it is a most excellent hinge.

The "Union" spring hinge, Figure 109, is a form in which the resistance is derived from flat band springs. The peg shown above the spring is moveable, and by turning up the hinge-pin

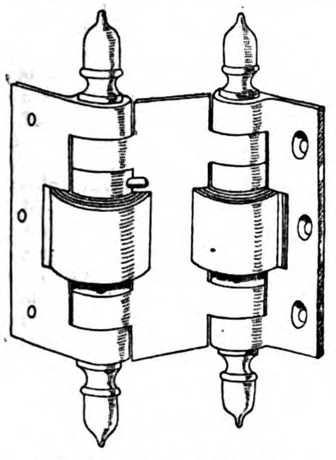

Fig. 109. Union Spring-hinge.
M. W. Robinson.

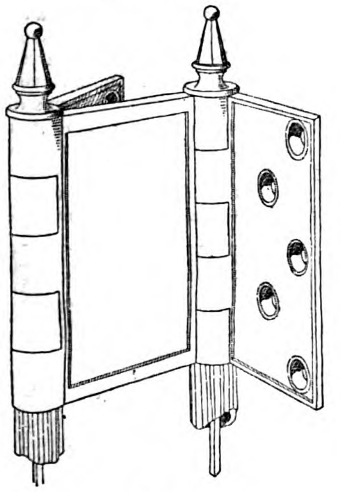

Fig. 110*a*.

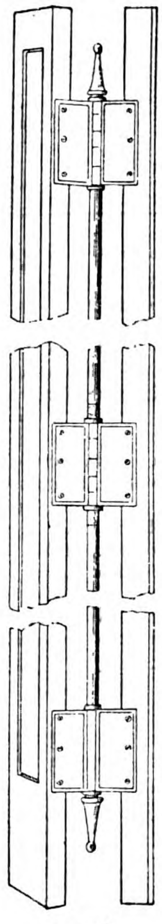

Fig. 110*b*.

the peg can be set in any of the holes in the pin, as may be necessary to retain the desired resistance. One end of the band spring is fastened to the hinge-pin and the other hooks into a slot on the adjoining hinge-plate. The hinge illustrated is intended for light doors. For heavier work a hinge is made with four such springs, two on each hinge-pin.

Figure 110 shows a form of spring butt which depends for its action upon the torsion or twisting strain in a steel rod,

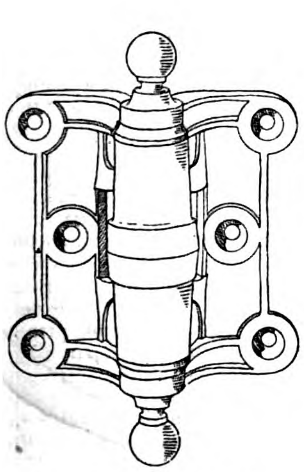

Fig. 111. Hero Spring-hinge.
Van Wagoner & Williams Co.

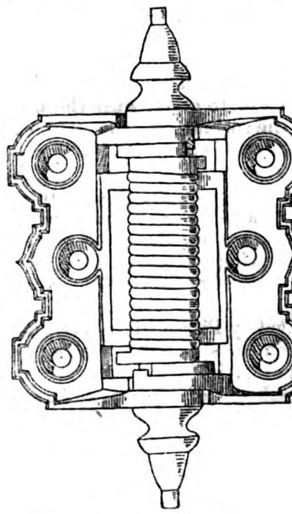

Fig. 112. Nickel Spring-hinge.
Coleman Hardware Co.

which is carried from the bottom to the top of the door.

The disadvantages of nearly all of the forms of spring hinges previously considered is that they are apt to cause the door to slam, and the door cannot be kept open except by placing something against it. Spring hinges which will keep the door open or cause it to close are peculiarly an American invention and one of the most ingenious of its kind.

There are four leading styles of hinges which have a hold-back feature. They are the Hero, Figure 111; the Nickel, Figure 112; the Devore, Figure 113, and the Wiles, Figure 114. All of these hinges are necessarily single action. They are alike in that they are planted on the face of the door and door frame, and are delivered ready to be set, with the tension fully applied. The principle on which they work is simply this: The spring is coiled about a shank entirely disconnected from the pin of the butt and either united to the butt plates by top and bottom pieces which hook on the opposite sides of the

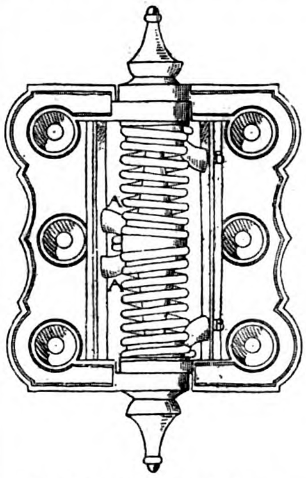

Fig 113. Devore Spring-hjnge.
Freeport Hardware Mfg. Co.

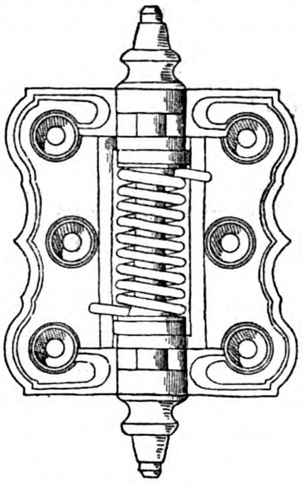

Fig. 114. Wiles Spring-hinge.
Freeport Hardware Mfg. Co.

hinge, as in the Nickel and the Wiles hinges, or with the springs themselves directly hooked onto the hinge-plates. In the Devore hinge two springs are used, the ends caught at the centre on one leaf *A*, while the outer ends catch on hooks at *B*, *B*. In this way, it will readily be seen that as the hinges open, the hooks to which the spring is attached are separated from each other, and consequently the spring is drawn tighter. But as soon as the hinges have passed through about three-quarters of the distance they are to swing, the horizontal distance between the points of attachment, at top and bottom of the spring becomes less, and the tendency is to draw the door open and hold it so. It is very difficult to show this action by a diagram, but Figure 115 may help to make it understood. Let *A* represent the jamb and *B* the door; *C*, a double turn of spring wire hooking on to the two arms, *D*, *D*, fastened respectively to the jamb and the door. When the door is opened, the ends of the spring are forced apart, but at the same time the spring forces itself out of centre, turning on the hooks of *D*, *D*, until, when the door has moved through 180 degrees, it is evident that the spring has both moved and turned so that the ends tend to draw the arms *D*, *D* together, rather than to push them apart.

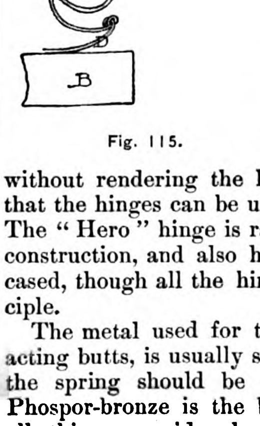

Fig. 115.

In order that the springs should be free to move, as just explained, the hinge-pins cannot extend through the butt, and the strength depends entirely on the flanges of the plates to which the pins are attached. As these cannot be made very large without rendering the hinge clumsy in appearance, it follows that the hinges can be used only for comparatively light doors. The "Hero" hinge is rather neater and apparently simpler in construction, and also has the advantage of having the hinge cased, though all the hinges are on essentially the same principle.

The metal used for the springs in connection with double-acting butts, is usually steel, in which case it is advisable that the spring should be nickel-plated, to guard against rust. **Phospor-bronze is the best and most durable material to use, all things considered, though we are unable to state any**

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particular hinge in which it is employed. Some compositions of brass, bronze, etc., are used with varying success. The different hinges are generally made with but one kind of spring throughout, so that a choice in the metals is implied in a choice of a hinge. The metal is, however, nearly always steel, as just stated.

The following table gives the retail prices of the spring butts and hinges previously described. For purposes of comparison, the figures represent the prices in each case of the size of hinge necessary for an ordinary door, from $\frac{7}{8}$ to $1\frac{1}{8}$ inches thick; excepting, however, that the price for Figure 101 is for a light screen-door hinge. The hinges are in general made in a number of sizes from those for the lightest kind of screen-doors, to those required to move doors weighing several hundred pounds.

TABLE OF SPRING-HINGES.—RETAIL PRICE PER PAIR.

Fig.	Name.	Bronzed or Japanned Iron.	Nickel Plated.	Brass or Bronze.
99	Garden City single-acting spring-butt....	$ .60	$1.60	$ 4.80
100	Garden City single-acting spring-butt....	.15	.75	1.80
101	Keene's saloon-door hinge...............	.60	1.20	4.00
102	Garden City double-acting spring-butt...	.80	2.16	6.40
103	Empire spring-hinge.................	.25	——	——
104	Star spring-hinge.........................	1.36	3.00	3.00
105	Crown spring-hinge.......................	1.20	——	——
106	Chicago double-acting spring-butt........	3.20	6.00	16.00
107	Champion spring-hinge....................	1.40	3.50	4.25
108	Jewett spring-butt........................	3.50	——	12.00
109	Union spring-hinge.......................	2.50	——	7.00
110	Torsion spring-butt....	4.50	——	{ about 12.00
111	Hero spring-hinge...	.18	.33	
112	Nickel spring-hinge[1]......................			
113	Devore spring-hinge[1].....................			
114	Wiles spring-hinge[1].......................			

[1] We are unable to state any prices for these hinges, as they are not found in the Boston market. They would probably sell at the same prices as the Garden City Butts, Figure 100.

[To be continued.]

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

DOORWAY TO HOUSE OF HENRY C. JACKSON, ESQ., BOSTON, MASS. MESSRS. ALLEN & KENWAY, ARCHITECTS, BOSTON, MASS.

[Helio-chrome, issued only with the Imperial Edition.]

GOTHIC TOWERS AND SPIRES, PLATES 28, 29 AND 30.—ST. MARY'S, ST. NEATS; ST. PETER'S, ROUNDS; ST. LEONARD'S, LODDINGTON; ST. JAMES THE APOSTLE, SPALDWICK; ST. NICHOLAS'S, COTTESMORE.

[Issued only with the Imperial Edition.]

OBWEBETUCK INN, SOUTH WINDHAM, CONN. MR. HOWARD HOPPIN, ARCHITECT, PROVIDENCE, R. I.

THE building is placed upon a high plateau overlooking a beautiful country. Walls are of rough rubble, red joints. First story, clapboarded. All above, shingled, stained red.

SCENES IN THE PLACE LOUIS XV, PARIS.[1]

THESE illustrations are reproduced from "*Tableaux Historiques de la Révolution Française*" in connection with the article on "Equestrian Monuments" elsewhere in this issue.

ROOD-SCREEN FOR ST. JOHN'S CATHEDRAL, DENVER, COLO. DESIGNED BY MR. CHARLES R. LAMB, NEW YORK, N. Y.

THIS screen which was manufactured by Messrs. J. & R. Lamb, New York, is 28 feet high and 32 feet wide.

DESIGN FOR THE "ARAGON," CHICAGO, ILL. MR. L. S. BUFFINGTON, ARCHITECT, MINNEAPOLIS, MINN.

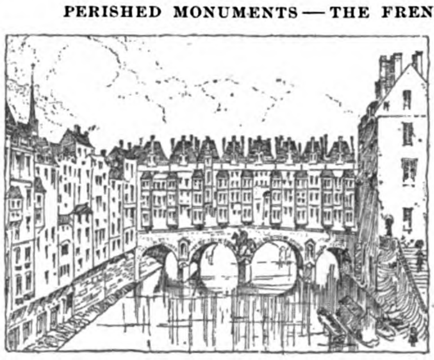
DESIGN FOR A Y. M. C. A. BUILDING. MR. WARREN H. HAYES, ARCHITECT, MINNEAPOLIS, MINN.

[1] After this plate was printed, it was found necessary, through lack of space, to defer to a later issue the description of the Statue of Louis XV here shown.

FACTORY FOR MESSRS. EDWIN C. BURT & CO., NEW YORK, N. Y. MESSRS. DE LEMOS & CORDES, ARCHITECTS, NEW YORK, N. Y.

EQUESTRIAN MONUMENTS.—VIII.[2]

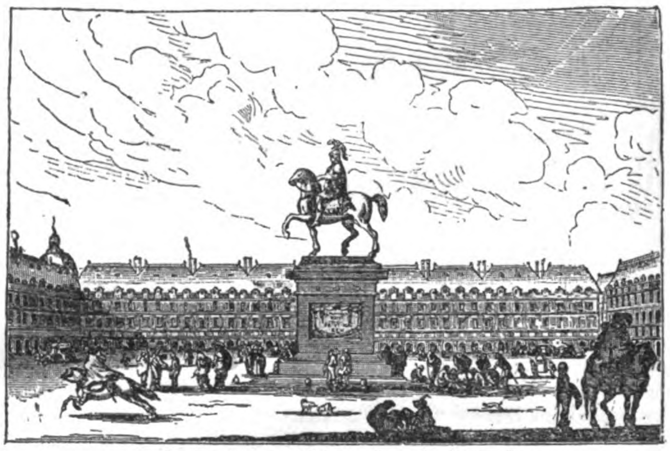
PERISHED MONUMENTS—THE FRENCH REVOLUTION.



The Statue of Louis XIII on the Pont St. Michel, Paris.

ANOTHER equestrian statue that perished, or possibly merely disappeared in the bottom of the Seine on the eleventh of August, 1792, was the statue of Louis XIII which crowned the central abutment of the Pont St. Michel, at Paris. The cut merely indicates its position. Of its size, character, material and history it has been possible to secure no other trace.

The equestrian statue of Louis XIII, which formerly stood in the Place Royale, at Paris, now the Place des Vosges, is one of the many instances of transubstantiation, so to say, that at various times have affected public statues. Catherine de' Medici, who, with true Italian vindictiveness, had avenged the death of her husband, Henri II, by torturing to death the unfortunate Montgomery, Captain of the Scottish Guards, who had accidently killed the King in a tournament in 1559, held in honor of the Peace of Cateau-Cambrésis, desired to erect a monument to his memory. Being an Italian she naturally turned to Italy for help, and as naturally applied to the greatest of Italian masters, Michael Angelo. The sculptor, because of his great age, was disinclined to undertake the commission, although it is said he made a sketch for the statue, but advised that the work should be entrusted to Daniel of Volterra, promising to aid him with suggestion and criticism. Volterra accordingly made a sketch-model, aided by Michael Angelo's advice, and it proved so satisfactory that a contract was made with him, amongst the conditions of which was that the horse should be "twenty palms high," and that it should be cast in a single piece. The modelling of the figure and the preparation for casting occupied several years, and, after all, the first attempt was a failure, a fact which so affected Volterra that, although the next attempt was successful, he became consumed with melancholy and unable to go on with the work, dying at length in 1566 shortly after the second and successful cast was made. The horse, weighing some 20,000 pounds and scaling somewhat larger than the horse of the "Marcus Aurelius," was finally finished and shipped to France; but it never received the rider intended for it, and was probably stored away to await some auspicious opportunity. For nearly three quarters of a century the horse was either stabled in darkness, or was set up somewhere as a pointless piece of equine sculpture, for it was not until 1639 that it received a rider, and then not Henri II, as intended, but a Bourbon ruler, Louis XIII. The figure of Louis was modelled by Pierre Biard, *fils*, and the statue was set up September 13, 1639, on the spot where formerly was the court-yard of the Palais des Tournelles, in which the unfortunate tilting accident took place. The pedestal of the statue bore laudatory inscriptions prepared by Cardinal Richelieu, whose happy inspiration it was to unite economy and adulation by mounting an image of his august master on a second-hand steed. The horse was considered particularly good, being somewhat light of limb and animated in action.



Statue of Louis XIII in the Place des Vosges.[3]

Inasmuch as Louis XIII was surnamed the Just, it is supposable that on August 11, 1792, the crowd proceeded to pull down his statue with less alacrity than they showed in destroying the statues of the two succeeding Louis; but down it came all the same, and when things

[2] Continued from page 170, No. 668.

[3] From M. F. Hoffbauer's "*Paris à travers les Ages.*"

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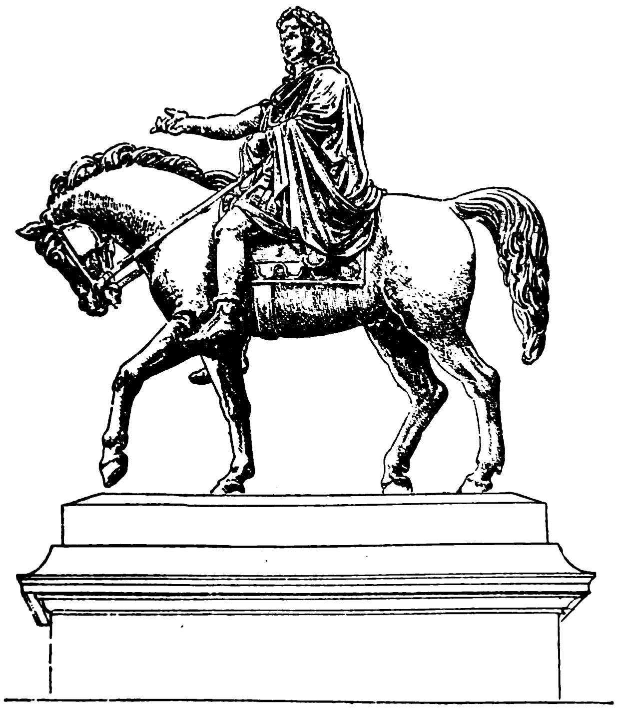
became quieter the place, now named no longer Place Royale, but Place des Vosges, was adorned with a bronze fountain which remained there till, just before the Revolution of 1830, another equestrian statue of Louis XIII was erected in the year 1829. This time the statue was of marble, and was the work of Dupaty and Cortot.

The day on which destruction overtook the great equestrian statue of Louis XIV in the Place des Conquêtes, or de Louis le Grand, now the Place Vendôme, is by some given not as August 11, but as



Marble Statue of Louis XIII now in the Place des Vosges, Paris. Dupaty and Cortot, Sculptors.[1]

August 14, 1792, the day on which Louis XVI and his family were transferred to the Temple; and, further, that the work of destruction was going on as the carriage containing them came up and a halt was made that they might have full benefit of the sight and understand the love that their loyal lieges bore to the royal family and its belongings.

Lister in his "*Travels in France*" [1698] says: "This colossus of brass is yet in the very place where it was cast; it is surprisingly

Daniel of Volterra's Statue of Henri II, as it was to be.[2]

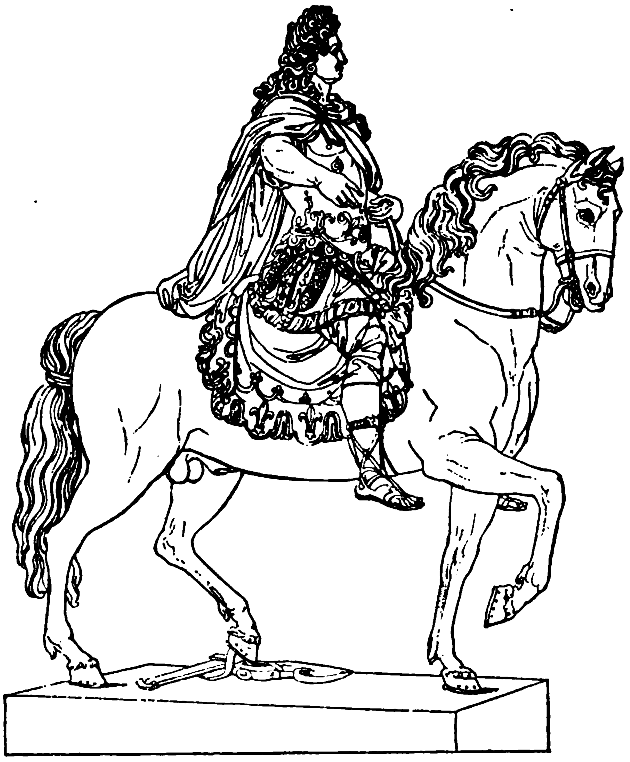
great, being twenty-two feet high, the feet of the king twenty-six inches in length, and all the proportions of him and the horse suitable. There was 100,000 pounds weight of metal melted, but it took not up above 80,000 pounds; it was all cast at once, horse and man. Monsieur Girardon told me he wrought diligently, and with almost daily application at the model eight years, and there were two more years spent in the moulding and furnaces, and casting of it. The king is in the habit of a Roman emperor, without stirrup or saddle, and on his head a French large periwig *à la mode*. Whence this great liberty of sculpture arises, I am much to seek."

This statue which was the work of the sculptor Girardon was one of the largest bronze statues of modern times and it was all the more

[1] From M. Paul Marmottan's "*Les Statues de Paris.*"
[2] From Cicognara's "*Storia della Scultura.*"

remarkable that horse and rider were cast in one piece by a Swiss founder, Jean Balthazar Keler. It was erected August 13, 1691. The pedestal which supported it was of white marble.

Although Girardon's statue of Louis XIV was very effectively destroyed, records exist which show the merits of this, one of the most famous of modern equestrian statues: first, there is a model some three feet high in the Louvre which is said to be exact and authentic; next, there was exhibited in the Palais du Trocadéro, in



Model of Girardon's Statue of Louis XIV, now in the Louvre.[3]

1878, a statuette of cast-iron, gilded and damascened, which is not only interesting because it, too, is said to be a good miniature copy of the original, but because it is one of the earliest pieces of cast-iron

Cast-iron Statuette of Louis XIV, after Girardon.[4]

work, at any rate of a sculptural character. It is the work of Maximilien Titon, an armorer who had a celebrated shop on the Place de Bastille; and because of his connection with the Government it was probably cast in the Arsenal, where was congregated all the knowledge and experience of the age in the matter of working metals.

In connection with Girardon's work, the story is told that he made and set up first another statue which was found too small for the site, and so was given to the Marshal de Boufflers, who subsequently gave it to the city of Beauvais, a gift which was received with enthusiasm by the young men of the city who went out to meet

[3] From Clarac's "*Musée de Sculpture antique et moderne.*"
[4] From the *Gazette des Beaux Arts.*

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it, and, during the last few miles of its transit, dragged it in triumphal procession with their own hands.

Another bronze statuette, believed to have been made during the existence of the original, is also known and varies only slightly from the others.

There was also found in the cellars of the Louvre, which still

Bronze Statuette of Louis XIV, after Girardon.[1]

store many a forgotten treasure, a small plaster model of an equestrian figure clad in the costume of a cavelier of the period, and to this has been assigned, on no very satisfactory authority, the name of Louis XIV.

RICHELIEU'S INSCRIPTION FOR LOUIS XIII.

Pour la glorieuse et immortelle memoire du tres-grand et tres-invincible Louis le Juste. XIII du nom, Roi de France et de Navarre. Armand Cardinal de Richelieu, son principal Ministre dans tous ses illustres et genereux desseins; Comblés d'honneurs et de bienfaits par un si bon Maitre et un si genereux Monarque, lui a fait elever cette Statue: pour une marque eternelle de son zele, de sa fidelité, et de sa reconnaissance, 1639, (repeated in Latin).

Sonnet by Jean Desmarets de Saint-Sorbin of the Académie, engraved in Latin and French on the remaining faces of the pedestal:

Que ne peut la vertu, que ne peut le courage?
J'ai dompté pour jamais l'Hérésie en son fort;
Du Tage imperieux j'ai fait trembler le bord,
Et du Rhin jusqu'à l'Ebre accru mon héritage.

J'ai sauvé par mon bras l'Europe d'esclavage
Et, si tant de travaux n'eussent hâté mon sort,
J'eusse attaqué l'Asie, et d'un pieux effort
J'eusse du Saint Tombeau vengé le long servage.

ARMAND, le grand ARMAND, l'ame de mes exploits.
Porta de toutes parts mes armes et mes loix
Et donna tout l'éclat aux rayons de ma glorie.

Enfin, il m'éleva ce pompeux monument,
Ou, pour rendre à son nom mémoire pour mémoire,
Je veux qu'avec le mien il vive incessament.

DANIELE DA VOLTERRA, whose right name was Daniele Ricciarelle, was born at Volterra in 1509, and studied under Il Sodoma and Baldassare Peruzzi. He then went to Rome and found employment as assistant to Pierino del Vaga, and afterwards gained the friendship of Michael Angelo, who frequently assisted him with designs and instruction. Volterra's chief fame rests upon the series of frescos in the Capella Orsini in the church of La Trinita de Montè, upon which he labored seven years. The principal one is the famous "Descent from the Cross," the painter's masterpiece. After the death of Pierino del Vaga, Daniele was appointed by Paul III, upon the recommendation of Michael Angelo, to fill the post of superintendent of the works at the Vatican. His last great work as a painter is "The Murder of the Innocents," now in the Uffizi Gallery, at Florence. On the death of Pope Paul III, in 1549, Volterra was removed from his office of Superintendent, and appears to have devoted the latter part of his life to sculpture. He earned the name of "Breeches-maker" through having been employed to add draperies to some of the nude figures in Michael Angelo's "Last Judgment." He died at Rome in 1566.

JEAN PIERRE CORTOT. — Born at Paris, 1787. Died 1843. Pupil of the younger Boridan. Prix de Rome, 1809. Member of the Institute. His most noted works are "Daphnis and Chloe," in the Louvre; "The Soldier of Marathon," for the Tuileries Gardens; a statue of "Casimir Perier," for his tomb at Pére La Chaise; "Marie Antoinette sustained by Religion, in the Chapelle Expiatoire"; The statues of the cities of Brest and Rouen, in the Place de la Concorde; "The Apotheosis of Napoleon," for the Arc de Triomphe; the sculptures in the the pediment of the Palais du Corps Legislatif; a group of "France and Paris," for the monument of the Duc de Berri; and an equestrian bas-relief of Louis-Phillippe in the Tuileries. He completed the equestrian statue of Louis XIII left unfinished by Dupaty.

CHARLES MERCIER DUPATY.—Born at Bordeaux, 1771. Died 1825. At first he studied painting, but at length devoted himself to sculpture under the teaching of Lemot. He won the Prix of Rome in 1799. His works are "Ajax pursued by Neptune," the principal group of the monument to the Duc de Berri, a group, "Venus discovering herself to Paris," and the statue of the Virgin for the Church of St. Germain des Près, with others.

LOUIS XIII. — Eldest son of Henry IV. Born 1601. Died 1643. Nominally succeeded his father in 1610, at the age of nine, under the regency of his mother, Maria de' Medici, but, wearied of her control, he threw it off in 1617, and by the murder of her minister, Concini, became king, though compelled to carry on a civil war against his mother and her supporters for several years; become at length reconciled with her in 1624. Married Anne of Austria in 1615 Cardinal Richelieu was his prime minister for eighteen years.

LOUIS XIV. — Eldest son of Louis XIII. Born 1638. Died 1715. Succeeded his father at the age of five, under the regency of his mother, with Cardinal Mazarin for prime minister. Assumed full control at the age of fourteen. In 1660 married Maria Theresa of Spain.

FRANCOIS GIRARDON. — Born at Troyes 1630. Died 1715. He was assisted in his studies by Chancellor Seguier and became a reputable sculptor, being pensioned by Louis XIV while in Rome and receiving many commissions from him after his return. He was finally appointed Director and Chancellor in the Academy. His works include the well-known monument to Cardinal Richelieu in the Sorbonne and a "Rape of Proserpine" in the Gardens at Versailles.

[To be continued.]

[1] From the *Gazette des Beaux Arts*.

MINERAL PRODUCTS. — CANALS. — TORONTO COURT-HOUSE. — QUEEN'S PARK, TORONTO. — THE ROYAL VICTORIA HOSPITAL, MONTREAL. — A COMPETITOR SUES FOR COMMISSION ON ACCEPTED DESIGN. — THE TRAFALGAR INSTITUTE COMPETITION, MONTREAL. — VANCOUVER.

THE annual report upon mining and minerals of Canada for the year 1887 has just been issued, and furnishes us with some interesting statistics of the minerals in use by architects and engineers. The total value of the products all told is, in round numbers, about $15,000,000. The following are some of the items taken from the alphabetical list:

Product.	Quantity.	Value.
Brick, thousands.[2]	181,581	$986,689
Building-stone, cubic yards.	262,592	552,267
Cement, barrels.	69,843	81,909
Copper, pounds.	3,260,424	342,345
Flagstone, square feet.	116,000	11,600
Granite, tons.	21,217	142,506
Iron, tons.	76,330	146,197
Lead (pure in ore), pounds.	204,806	9,216
Lime, bushels.[1]	2,269,887	394,859
Marble and serpentine, tons.[1]	212	6,224
Mineral paint, tons.[1]	100	1,500
Pig iron, tons.	24,827	366,192
Slate, tons.	7,357	89,000
Steel, tons.	7,326	331,199
Tiles, thousands.	14,658	230,068

It would be a matter of considerable interest if some statistics of mineral products of the United States were published in this journal. There is always a quiet agitation going on for the further development of the mineral resources of the country, and there is certainly room for it, and there is, apparently, a great field of mineral wealth yet to be developed. If all the reports are true, we ought to supply our own coal: the number of tons yielded last year was 2,368,891, or $4,758,590 worth, while of gold 66,270 ounces, or $1,178,637 worth.

I have turned up some interesting statistics about the Canadian canals and their lengths mentioned in my last letter as forming so magnificent a waterway in connection with the rivers and the lakes, of 2,500 miles length. The total distance from the Straits of Belle Isle to Duluth — the head of the inland navigation on Lake Superior — is 2384 statute miles. Ten canals of a length aggregating seventy-one and one-half miles connect the rivers below and above the falls or rapids; the difference of levels amounting to 600 feet, of which the Canadian canals, with fifty-three locks, overcome a height of 532¾ feet. The Saulte Sainte Marie Canal, built by the United States, has only one lock, lifting eighteen feet. The sizes of the locks on this system range from 200 to 270 feet long by forty-five feet, and a depth of from nine feet to fourteen feet. The Government undertakes to make the whole route available for large vessels.

The canal route from Montreal to Ottawa and Kingston, on the Lake Ontario, has a total length of 246 miles with fifty-nine locks, and this is exclusive of the Lachine Canal (near Montreal) ten miles long and a lockage of 533¼ feet. The new works on this route give nine feet of water in locks, forty-five feet by 200 feet. Canal communication between the St. Lawrence River and the city of New York is secured by means of the Richelieu River and the Chambly Canal. It has nine locks with seven feet of water, and is connected with the Erie Canal and the Hudson River, giving a length of 411 miles. Of the Trente River Navigation between the Lake Huron and the Bay of Quinte (Lake Ontario) is 235 miles, a part only being navigable chiefly for the passage of logs or timber, and 155 miles are available only for vessels of small draught. Finally, there is the St. Peter's Canal cut through an isthmus half a mile wide between St. Peter's Bay on the Atlantic and the Bras d'Or Lakes of Cape Breton. This canal has one lock forty-eight feet by 200 feet, and a depth of eighteen feet. A new canal on Canadian soil is contemplated at Saulte Sainte Marie, which will make us independent of the American canal. These improvements will greatly facilitate the national carrying trade and give it a stimulus.

Here is something further about that long-promised Toronto Courthouse "competition." It will be remembered that in the competition

[1] Not fully reported.

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all the drawings were rejected because it was agreed by the committee that none of them could be carried out for the stipulated sum of $200,000. The tenders for the new building, those already accepted by the Committee, amount to $1,225,034, in addition to which must be added $80,000, the estimated cost of plumbing and steam-heating, for which no tenders were received; also $25,000 for contingencies, and $75,000 for furniture and the architect's commission, etc., making a total of $1,405,034. To meet this there is already in bank a sum of $823,000, the balance, $582,000, has to be raised from the rates, and it is intended to submit a by-law at the earliest opportunity for voting on. It was also proposed by some bright member of the Committee to submit the question as to whether white or red stone should be employed for facework, but this last piece of folly was voted down.

The Canadian Pacific Railway Company is making rapid progress with its works both in Toronto and Montreal, whereby it will enter both cities by a less circuitous route than at present. Nearly all the land has been purchased and the required facilities from the city have been obtained, and we may soon hope to see these much needed reforms take place.

It will be remembered that in a former letter an account of the serious trouble existing between the city and the University of Toronto over the unfulfilled conditions on the part of the city, of their lease of the Queen's Park, which is the property of the University, and how, for a time, the lease was hopelessly cancelled by the University, thus depriving the public of the use of a considerable area laid out as a park and taking away two principal thoroughfares that happened to cross this property. The University authorities have certainly behaved well in the matter, and have succeeded in waking up the sleepy aldermen to a sense of their duties, and through the energetic action of the mayor, terms have been arranged by which the Queen's Park will remain as it is for the rest of the years of the original lease. A considerable amount of trouble has been expended naturally, time and money in legal advice, and so on, but it has finally been agreed that the pending action of the University against the city shall cease, and that the *entente cordiale*, which should exist between the Corporations, shall be restored. All previous breaches of covenant on the part of the city shall be waived, and all existing street openings into the Park and avenues shall be allowed to remain without objection being raised on the part of the University. This secures again to the citizens for 970 years (the remainder of the term of the original lease) the Queen's Park as it is. The University is to dedicate in perpetuity two avenues valued at $350,000, one of which is absolutely necessary, as it is at present a main thoroughfare. These and sundry clauses of agreement have been arranged, and the citizens have to thank the University Corporation for their courtesy in allowing a settlement so greatly to the advantage of the city to be arrived at, when, apparently, it was for them to dictate terms and in their power to demand what they chose.

The Toronto Free Public Library has on its shelves some two dozen volumes of great interest recently "found" we are told by the Librarian. They consist of MSS. containing records in connection with the Government of the Province of Ontario, from its earliest days, with special reference to Toronto and its immediate neighborhood. These books were originally the property of a Mr. David W. Smyth, surveyor-general of the Province in those early days: they contain records of all his property which was very considerable. A plan is given of the city of Toronto and also the first known plan of any building in Toronto; namely, the house of this Mr. Smyth, with elevation in color and the plan of the garden and stables. But what is of greater interest is that it proves certain changes to have been made in the names of two or three streets, which discovery clears away a difficulty known to searchers of land titles, who until now have been unable to account for the want of agreement between descriptions of property and the actual plans. For instance, a description of a lot say on Duchess Street, corresponds with a lot on Duke Street and with no other, the old or original name for the street is now shown to have been "Duchess." When or why the change was made does not yet appear. Original minutes of the Government Council of 1796–97 up to 1800, with original letters of Governor Suncoe and several other interesting papers are among the MSS.

The long-talked-of Royal Victoria Hospital of Montreal is to be built at last. Over a year ago two wealthy citizens, Sir Donald Smith and Sir George Stephen each gave the large sum of $500,000 to build and endow a hospital to be erected on a certain site the property of the city, if the city would give the site for the purpose. A little below this site is one of the large reservoirs that supply the city with water, and a great cry was raised by both English and French that the water would be contaminated by means of the Hospital if erected there. In their difficulty the Hospital Committee of the Corporation referred the matter to two well-known doctors, one of each nationality, who were separately to report as to the probable result of erecting the hospital on this site. It was a sensible step to take and would undoubtedly set the matter at rest, deciding the controversy one way or the other. Not a bit of it. The Doctor's reports were exactly the opposite of each other. The Englishman in a long and exhaustive report in which he submitted evidence of similar situations in all parts of the world showed most conclusively that the water would not be in the least danger of contamination. The Frenchman's report went to prove the folly of erecting the hospital on this site, and so "when doctors differ," etc., the Committee were worse off than before. There the matter stood; Mr. Saxon Snell was sent for to look at the site and prepare plans, a really excellent move on the part of the Committee and one which, if the idea originated with themselves, ought to redeem them at least from the characteristic of pigheadedness of Corporation Committees in general. Nothing was heard further for a long while; but the idea gained ground that considering the diversity of opinion on the matter it would be wiser at any rate, if possible, not to build there. Fully recognizing the difficulty the most liberal donors have come forward again with another offer. They consent to a change of site and give a further sum of $80,000 for the purchase of another site. Making this the final condition on which the total of $1,080,000 shall remain to be used for this object. Naturally this has been accepted and so the "Jubilee" hospital will no doubt be commenced at once. Such princely gifts do not occur every day and it is a pity so long a time should have been allowed to elapse, but it was an awkward predicament for a corporation to be in. The advent of Mr. Saxon Snell caused some disappointment among the local professional men. It was at least hoped the hospital would have been competed for, but I fancy Mr. Saxon Snell would really have been the author of the successful design by a local man, through the medium of his great work on hospitals, which would have been largely consulted no doubt.

With regard to competitions they certainly have not proved a happy method of settling the matter in question, in Montreal particularly, where there has been one advertised. A lamentable case was that of the competition for the Trafalgar Institute, a "College for the Higher Education of Women." The competition was advertised in a feeble kind of a way because the same Sir Donald Smith offered to give $25,000 towards the building if begun by a certain date. When intending competitors applied for particulars, they were told there were none: the Committee did not understand that architects would necessarily like to know something of what was wanted. However, the Committee put their heads together and a list was produced of the rooms, etc., required. Designs were sent in and as usual in cases of this kind the good men on looking at them were totally bewildered. After a long time, however, a decision was arrived at, but when tenders were in for the chosen design they exceeded the amount by so great an extent, that the design had to be thrown out. The next chapter bowled the Committee over. Mr. Sorby, the author of the design, proceeded to take out an action against them to recover the amount of commission on the building as carried out according to his plans, claiming that the wording of the instructions admitted of an interpretation as to cost which justified him in acting as he did. The action has not yet been gone on with, so far as I can learn, and the new building is still where it was three years ago. What arrangement may have been arrived at is as yet not made public even to other competitors, and in the meantime the architect of the chosen design has moved from Montreal to Vancouver.

Mention of Vancouver, reminds me that it is the youngest city of the Dominion, and a child of great promise it appears to be. Four years ago it had no existence. In July, 1886, it had a population of 1,200, July, 1888, that had increased to 8,500 which leads sanguine statisticians to hazard the remark that by July, 1889, the population will be 20,000. It certainly has a good future before it. As the terminus of the Canadian Pacific Railway and the new port for communication with China, India and Australia, it ought to rise rapidly and in time become a very important city. In connection with this I may mention that Owen Sound on the Lakes, the inland port in the route from east to west, mentioned in my letter, last month, gives another sign of improving according to this morning's papers. It is stated "that owing to the increased traffic on the Main Street, the Town Council have decided to open up and place in proper condition the street along the east side of the river," etc.; this ought to be a sign of considerable progress.

CONSTITUENTS OF THE SUBSOIL. — DEFECTS OF PILE FOUNDATIONS. — IRON AND CONCRETE FOUNDATIONS.

DURING the past season several extremely heavy buildings have been commenced here, and in watching the operation of putting in their footings and foundations one cannot but be impressed with the changes that have taken place during the last ten years in this branch of building.

Owing to the fact that the soil under that part of the city where the heaviest buildings have recently been erected is unusually poor for heavy foundations, probably more experiments have been made and more experimental kinds of footings have been put in at Chicago than in all other parts of the country put together. In a general way the soil in this part of the city may be said to consist of three strata, of which the first is sand for a depth of some eight or ten feet. This sand is generally quite clean and fairly sharp, of yellowish color, and evidently a deposit formed under the water when in some, not very remote

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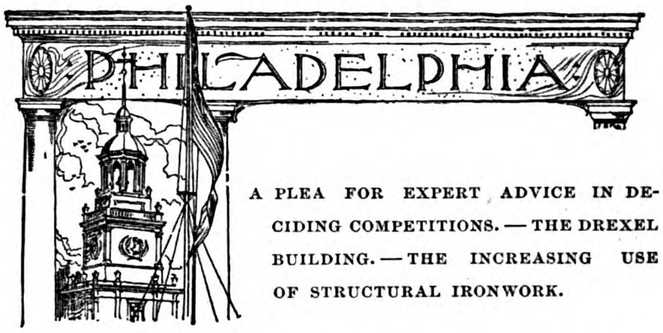
geological period, this portion of the country was entirely beneath the waves of Lake Michigan. In most parts of the city where the soil has never been disturbed by previous building operations this sand enters largely into the common mortar for brickwork, although not coarse or sharp enough for rubble-work or of sufficiently good quality to be used for plastering or fine work. Continuing to a greater depth beneath this stratum of sand is a clay, bluish in color, and for the first few feet quite hard in composition, so that a pick-axe is often necessary to make any progress in it, but after these few feet it gradually becomes softer until at a depth of something like eight or ten feet it has become about the consistency of lard, a formation that continues of a practically homogenous character for a depth of nearly fifty feet until bed-rock is reached.

When the first heavy buildings were erected the only method of footings that seemed to receive attention, or possibly it would be nearer the truth to say that the only method that was known as applicable to such poor soil, was the system of piling. Very shortly, however, it was found, principally owing to the nature of the clay, that there were numerous and very important objections to this. In the first place, it was very expensive: and in the second place, piles even when once driven into the clay were not fixtures until loaded, for the driving of an adjoining pile had the tendency to cause No. 1 to pop up again. Owing to the great difficulty of properly and accurately proportioning according to their weights the number and distance apart of the piles, the buildings even when once placed upon them had the tendency to settle unequally, and as these piles could just as easily go down through the soft clay an additional twenty feet as they had gone the first fifteen, they frequently started on this downward career with anything but happy results for the building. The system of piling was, however, practically abandoned within a few years after the great fire, partially on account of the expense but more particularly because of the unsatisfactory results. This method was employed in some of the public buildings, as among the last examples of its use, but the results as now seen have probably rather emphasized the opinion already formed, and probably no architect would now propose to use, under ordinary circumstances, this system.

The principle gradually became recognized and was slowly acted upon, that the foundations should not be sunk to any great depth but should spread out rapidly and as near as possible at the top of the clay hard-pan. But as this idea was acted upon, it soon offered one great objection, that the cellars became of no practical value as they were filled up with a host of stone pyramids which received the columns and piers of the building proper. Even with dimension-stone in the footings it was not found desirable to make offsets of more than fourteen to eighteen inches at the very greatest, so that as the buildings became higher and heavier, the pyramids became larger and larger until it was evident that some means must be found to enable greater offsets to be made on each course, and consequently correspondingly reduce the size of the pyramidal foundation. Probably one of the first important steps in this direction was in the footings of the new Board of Trade Building, where large timbers were introduced into the concrete. From timber to iron was but a step, still it was *the* great step that very materially changed the character of our extremely heavy foundations. It was indeed a radical change which was quickly taken advantage of and very quickly brought to the point where now used. In the earlier uses of iron a heavy footing of concrete was first laid down and upon this railway iron was tightly placed side by side until the entire concrete was covered, then concrete was slushed in between and another course of rails similarly laid but at right angles to the first course, and this in its turn thoroughly slushed up with concrete, and a thin coat of the same on top. This course of the footing was then complete and an offset of three feet was considered admissible. Thus an enormous weight could by means of several such large offsets very quickly be distributed over a large surface of footing. This was the starting-point and the main principle of our present system of heavy foundations, but it has with slight variations, as necessitated by different requirements, been played up and down the whole scale of foundation construction until now scarcely a heavy building is erected but that the footings contain more or less iron. If railroad irons were good why were not I-beams better, and acting upon this principle many beams as wide as 12 inches, have been used until the quantity of iron stored away in some of these foundations, makes of them veritable iron mines. The question had often been raised but never (certainly in your correspondent's hearing) been very satisfactorily answered, what will be the lasting qualities of the iron thus embedded in the concrete. Isolated cases of iron in concrete are cited but the conditions are generally different and most of the parties contend, apparently more because they wish it to be so than because they have any strong array of proof, that beyond a thin coating of rust the iron will remain perfectly intact for ages. Certainly it is to be hoped that such will be the case, but as for the actual proof of using iron under similar conditions it would seem as if very few actual examples can be cited, and that the future architects only, will be able to judge more fully upon this point.

The latest experiment that seems to have been tried is to cover—before commencing the footings—the entire area of the excavation of the building with a thick stratum of concrete laid directly upon the top of the clay hard-pan. The depth of this course is nearly two feet and its object seems to be to strengthen the clay so that the general settlement may be reduced to a mininum. Aside from this experiment, as far as noticed, the foundations of all the new buildings this year have been practically the same as during the last few seasons, still no one would be surprised to have at any moment some entirely new scheme tried, for every one is on the lookout to see if something still better and at the same time less expensive is not possible.



A PLEA FOR EXPERT ADVICE IN DECIDING COMPETITIONS.—THE DREXEL BUILDING.—THE INCREASING USE OF STRUCTURAL IRONWORK.

IT is not to be supposed that the complete satisfaction given to everybody connected with the Art Club Competition recently brought to such a successful close by Professor Ware will change at once the existing system, or rather want of system, in conducting competitions in Philadelphia. The architects can do much, however, by taking a firm stand in the matter at the first opportunity. No doubt there would be strong opposition at the beginning from the building public, and from those architects who rely on their powers of persuasion rather than on their powers of design; but one can easily see what immense good would result to the city if invited architects would refuse positively to go into any competition not based upon expert judgment. This Utopian method of deciding on the relative merit of designs submitted in competition will be slow of general adoption mainly because the public has an unwarrantably high opinion of its own judgment in such matters. In America people are in the habit of criticising a new building with as much assurance as though it were a new book. In the case of a book the average American's opinion would be worth something. He has grown up among books as he has among buildings, but with this important difference, that, whereas the buildings he is obliged to see are for the most part bad, or, at least, without merit, it depends entirely on himself whether the books he reads shall be of the best or of the worst that the world has ever produced. Ignorance of the classics of literature is more or less a matter of choice; to know the classics of architecture, an American must have had time and money in plenty. When we consider that besides this the amateurs of architecture are comparatively few, it is all the more surprising that men, even sensible, hard-headed business men, who would not be willing to stake much on the correctness of their judgment as literary experts, have of late adopted the plan of holding competitions for important buildings, and appointing themselves judges of the designs, when so far as the probability of their choosing the best design is concerned, a jury of shoemakers would be quite as likely to choose the best out of half-a-dozen landscapes, or a congress of dentists decide on the merits of a steam engine. The folly of this kind of decision becomes all the more apparent when the other requirements of the competition are subordinated to the usual "handsome front" clause of the programme. But it is unprofitable to speculate as to what kind of design can least afford to be judged by laymen, and this whole discourse on the harrowing subject of competitions would be unprofitable if it were not for the hope that some architects may be found willing to demand the simple right—one that is not accorded but insisted on by the public in all professions and arts except architecture—the simple right of having their designs judged by experts. When this ideal state of affairs shall have come to pass that corporations about to build shall put their work into the hands of some architect of established reputation, or shall call in an expert to aid their judgment by pointing out in the competitive designs the merits and defects that only a professional would notice until the building was under way, then and not before will be the end of the numberless sham competitions where the award is made to the man who has the strongest "pull."

Some months ago, in speaking of the causes that led to the dissolution of the Knights of Labor, I had occasion to mention the immense amount of marble used in the Drexel Building. This is one of the latest of Messrs. Wilson Bros. & Co.'s works. It is just finished, and as it is the largest and most important office-building in Philadelphia, a notice of some of the special features of its construction will not be out of place. In size it is very nearly the same as the Equitable Building in New York, covering rather less ground, but being three stories higher. The plan is like a huge letter H, and the dimensions—according to the *Public Ledger*, which is authority for many of the following points as well—one hundred and forty-two feet by two hundred and twenty, and the elevations show a cellar, a basement story, ten other stories and an attic, bringing the roof to a height of one hundred and thirty-five feet above the pavement. On the west is Fifth Street, on the north Chestnut, and on the east and south Custom-House Place and Library Street. In the middle of the Chestnut Street front (the upper half of the "H")

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stands the Independence National Bank, occupying the only part of the block not owned by Mr. Drexel, who has torn down to make room for his new building, the Law Building, as well as the old Philadelphia Library, and the old post-office, the quarters of the last two having been swept farther up town by the irresistible westward tide of business. The space below the cross of the "H" corresponding to that occupied by the Independence Bank is left as an open court. The effect of the Chestnut Street front is somewhat marred by the little bank tucked in between the two towering marble wings of the Drexel Building, more especially as, owing to some disagreement about the terms on which light might be taken for the new building above the bank roof, there are no windows in the marble facing of the party-wall. That so large a building should have been finished so quickly as this one is almost phenomenal, for it was only seventeen months ago that the work of excavating was begun. The unusually open weather of the first part of last winter was of the greatest help, as was the now universal covering-in and heating of the building during the progress of the work, but a new method of construction — almost unknown before in this city — should have the largest share of the credit. In order to get the greatest amount of light and room, the windows were made as large as possible, and the piers as small. Up the middle of each pier runs an iron column, and on these columns rest the floor girders, so that the masonry has nothing but its own weight to carry. The four largest marble quarries in the country were kept busy during the work, but even they could not supply material fast enough, so that the building would have been seriously delayed if it had not been possible to go on with the iron framework without waiting for its marble covering. At one time, in fact, the floor beams were in position four stories higher than the top of the walls. The south-east corner of Fifth and Chestnut Streets was, and still is, occupied by the banking-house of Drexel & Co. It was desired to incorporate it in the new building, and this has been done with the utmost success, from an engineer's as well as from an architect's point of view. The ceiling of the banking room reaches the fifth floor of the new building, and the problem was to support the six upper floors and attic of the latter on top of it. Girders of sufficient strength would have been greatly in the way, and no columns could be set up in the banking-room without being a serious disfigurement. The floors above are, therefore, held up by enormous trusses, running up through four stories, where they help to make partitions between the offices. The iron boxes on which the ends of these trusses rest are, to be sure, on the inside of, and anchored to, the banking-room wall, but as they were put up at night and after banking hours in the daytime, their erection in no way interfered with business, and their covering of colored marble makes them rather an interesting feature than an eyesore. The rooms above the Board of Trade room (which is on the second floor of the eastern wing) are supported in the same manner. In the new building for the Provident Life and Trust Company, by the way, that is just begun a little farther down Chestnut Street, Mr. Furness has adopted a similar method of construction, where a higher truss even than this, the shape of the lower part of a letter "A" holds floor upon floor suspended from its upper angles.

In spite of the enormous advantages that the modern use of iron gives to the architects of to-day in such cases as this, so that, as in the Drexel Building, we may have, with a comparatively limited ground area, four hundred rooms all admirably lighted, and without an ounce of combustible material in their construction, it is to be doubted whether this increasing use of constructional ironwork is an unmixed blessing. As to its artistic effect, it will certainly be hard in the future, if experiment continues to open to us new capabilities in ironwork, to design a building that shall be really good if we are to keep getting the stone shell of it divided into smaller and smaller piers at the base, and the building itself towering higher than ever before. Perhaps it is not too conservative a wish to hope that the same causes that have led the Pennsylvania Railroad management to discard iron bridges for stone in the future, to the immense relief of people who have the slightest regard for landscape beauty, will bring about the abandonment of the wholesale use of iron in our city buildings.

THE PRATT FREE LIBRARY.—THE SHEPPARD ASYLUM.

THE more than local interest aroused by the designs for such a structure as the proposed Public Library of Boston, leads us to dwell for a few moments on what is (or should have been) one of the most important of the recently erected buildings in Baltimore, the "Pratt Free Library."

It would be a difficult task to criticise, or in any way describe, the results of the gift of one million dollars, made in the lifetime of the donor, where an unprejudiced opinion would force one even to admit that only absolute perfection had not been attained, without suggesting a lack of appreciative gratitude antagonistic to the natural responsive feeling of the community, kept aglow, as it always is, by the unintelligent commendation of the local press. Such criticism should only be written or read in the spirit that can completely separate the sincerity and generosity of the motive actuating the gift from the success or failure, from whatever cause, of the completed result. It is not a common thing, even in these days when large gifts and bequests to public objects often seem to follow closely in the wake of custom, or indeed of fashion, that an unsolicited and unexpected donation of a million dollars, in round numbers, is presented to a city, representing a large proportion of the total wealth of the donor, who in the course of one or two years sees his entire scheme embodied and in complete working order. Very rarely indeed would such an event be designated by an intelligent and unbiassed critic as "a calamity." Such, however, is the rather startling term we have heard applied in this case, and we will let the facts speak for themselves, questioning whether the word "calamity" is really misapplied to any rare opportunity conspicuously misused, from the sad point of view of "the might have been," — the unfortunate influence of precedent, the inevitable future recognition of the truth, and the consequent dissatisfaction.

The gift was accompanied by certain conditions relating to the details of the endowment that more or less influenced the development of the scheme, but which need not be discussed here, when merely an outline description of the building itself will serve the purpose.

The location, though near the centre of the city, is upon an unimportant, narrow street, which can never become a thoroughfare, and is in the middle of a block with unattractive surroundings, whereas the acquirement of a portion of the block immediately adjoining the present buildings, on which are only old dwellings, would have given one of the best possible positions, on a corner, with a frontage on a broad street, directly facing the great Ionic portico of the Cathedral and the open space around it. The front portion of the library building occupies the entire width of its lot, some seventy feet, more or less, with a dead wall at either end, abutting onto the adjoining property, which on one side is encumbered by out-buildings of objectionable character. The façade is a two-storied white marble screen, with florid decorations, which has doubtless been designated as "modernized Britain Gothic," suggesting almost anything but that a public library is hid behind it. The floors and walls of the entrance hall and stairway are covered with an elaborate pattern of various marbles and tiles in a style of design frequently seen of late years in many buildings devoted to less dignified purposes. Some half-dozen rooms in this front portion of the building are appropriated to registration, to the delivery and return of books, and to the board of management; while the rear, in the form of a long rectangular structure on the main axis, narrowed sufficiently to obtain light on both sides, contains, in two low-pitched stories, the "nests" of shelving for the books, with a more lofty reading-room above, at the extreme end of which is the librarian's sanctum and some toilet rooms.

The completion of this building is a rather remarkable instance of the very rapid—perhaps we might say more forcibly the very hasty—consummation of a benevolent scheme, in striking contrast to one or two others now in progress in Baltimore, conspicuous among which is the "Sheppard Asylum" for the cure of the insane — apparently those of a future generation, although the institution has already been in existence as a corporation for thirty-five years. Undeniably there is great need of security in the care of trust funds, but, without stopping to question the details of the management in this particular case, one cannot help feeling that this and some other trusts in the city are in the hands of certain men of undoubted integrity, but whose interest and pride seem to be rather in the safe and clever financiering than in the active philanthropy of the schemes which they have in charge.

The trustees of the Sheppard Asylum were incorporated as a body by the Legislature in 1853, with Moses Sheppard as president. Four years later he died, at the advanced age of eighty-four. By his will he devised the whole of his estate, with the exception of a few small bequests, to the "trustees of the Sheppard Asylum," absolutely without any limitations, instructions, directions or requests. His trustees, however, thoroughly understood his intention and design in founding the institution, as they were his personal friends, in constant and intimate intercourse with him, and among some written memoranda the following extracts were found: "My design is an institution similar to one near Philadelphia, belonging to the Society of Quakers, and, like that, under the direction of that description of persons principally. My desire is, all for use, nothing for ornament; the farm-house style; fireproof as far as practicable; a small and expensive institution; an experimental establishment; each person shall have an attendant when it may appear useful; first for the poor of the Society, secondly for such of the Society as are able to pay, and then for the poor indiscriminately; afterwards the trustees will use their discretion. *My leading purpose is* to found an institution to carry forward and improve the ameliorated system of treatment of the insane, irrespective of expense; an experiment in a small way for about seventy-five men and seventy-five women; all of them to have privacy, sunlight and pure air; and everything done for the comfort of the patients." And he several times reiterated

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the condition that "the income and not the principal is to sustain the institution."

The whole amount of the estate realized was something less than $600,000, and the average net income, after all the expenses were paid, has been about $24,000 per annum, all of which has been expended in the purchase and improvement of the property, and the erection of the buildings.

In 1858, a farm of three hundred and seventy-seven acres, about six miles from the city on Charles Street Avenue, was purchased for $70,000, and there has since been expended on the buildings, and improvements of various kinds, $758,000. The first stone was laid in 1862, and the last brick on the main buildings in 1879. In addition to this, a separate building has been erected for the water-tower, heating, ventilating and laundry purposes, communicating by a large tunnel and various branching sub-ways under all parts of the building, in which are placed all the necessary pipes, radiators, etc.

The Asylum proper consists of two buildings separated by about one hundred feet, each covering an area of about 25,000 square feet, and each three full stories and basement in height, designed for the separate accommodation of the two sexes. It is claimed that the buildings are as fireproof as iron stairways, brick-arched ceilings, slate roofs, etc., can make them.

The work has reached the point towards its final completion when the plastering and flooring is about finished. All the woodwork fitting-up of the interior remains still to be done, also all the details of heating, ventilating, plumbing, draining and lighting. It is maintained, too, that what has already been accomplished is most thoroughly done, and is the best possible of its kind, both as to the material and workmanship, and that the progress of such work could not have been more rapid under the conditions of a fixed and limited annual expenditure. Recently the possibility of hastening active operations by concentrating all the energy upon the completion of one wing was taken into careful consideration, but finally abandoned as not advisable; and it is now stated that it will require about four years' additional income to complete the entire scheme. So that a review of the facts given at present would make it appear that in 1892 the institution will be ready to enter upon its good work with an invested endowment of considerably over half a million of dollars and with its buildings and grounds representing nearly twice that amount.

For a long time its roofs and towers have been familiar and interesting features in the landscape. Having grown so slowly, its more immediate surroundings, its gate lodges, its driveways and its shrubbery, have grown around and with it, have lost all look of crude newness, and almost seem to be old landmarks. Only the idleness and loneliness about the place seems unnatural and weird, but perhaps not more so than, when in the future, it will become the home of its unfortunate inmates — unfortunate surely — but, let us hope that this great institution, in the fulfilment of its mission, will make them less unhappy.

SOCIETIES

TECHNISCHER VEREIN VON NEW YORK.

AT the annual meeting of the "Technischer Verein" (German Technical Society) of New York, held October 13, the following officers were elected:

President, G. W. Wundram, M. E.; Vice-President, E. A. Gieseler, C. E.; Corresponding Secretary, H. W. Fabian, Architect; Recording Secretary, H. Berg, M. E.; Librarian, F. Knauer, C. E.; Trustees, A. Kurth, C. E., P. Göpel, C. E., O. Fuller, M. E., A. Dörflinger, C. E., E. L. Heusner, M. E., A. v. d. Driesch, Architect, Th. Breyer, Chemist.

The number of members at present are:

Civil Engineers, 49; Mechanic Engineers, 111; Architects, 36; Chemists, 37; Total 233.

NOTES AND CLIPPINGS.

Under Ground Four Miles to the Theatre. — In some countries it would seem strange for a party going to see a theatrical entertainment to make a dive into Mother Earth, travel four miles under the mountains, and then dart up to the surface within a stone's throw of the ticket office, but it is after such a fashion that some of our people go to their regular dose of drama, comedy and tragedy. Last night a party of ladies and gentlemen of the town of Sutro, who wished to see "The Two Johns" at the opera-house, took the subterranean cut. Starting at the mouth of the Sutro tunnel, at their own doors, they came up the tunnel to the C. and C. shaft, a distance of a little over four miles. Dismounting from the cars they then boarded the cages in the shaft and were shot upward to the surface, a vertical distance of 1,640 feet. This way of going to the theatre is as much fun for our ladies as going to a picnic. It is really a pleasure, but until a lady has become somewhat accustomed to life in the mines it requires a little nerve. It is fine and cool the whole four miles under ground. The cars will not soil even the most delicate dresses of silk and satin, therefore there is no trouble of changing clothing. In her room at the mouth of the tunnel a lady may stand before her mirror and give the finishing touch to flower or feather, and in just such shape as she turns from her glass she is shot up to the surface in this city, ready to take her seat in the box in the opera-house. — *Virginia City Enterprise.*

TRADE SURVEYS.

Mention has been made of the rapid utilization of artificial fuel in the manufacturing establishments of the country. Quite a competition is in progress between them. There are ten or twelve methods in use, all of them are valuable in their way. Engineers are working at various economies and extending the application of fuel to a greater variety of uses. One of the most successful systems in use melts over 1,000 tons of steel, with a consumption of three gallons of oil per ton of steel The price of artificial fuel ranges in price from 3 cents to 5 cents. Within a year the cost has been very greatly reduced, and engineers and manufacturers are confident of still further reducing it. Another interesting feature is that artificial fuel is being introduced into a number of the smaller manufacturing establishments in the country. In a comparatively short time ten manufacturing establishments will be using artificial fuel, where one is using it now. It is a strong factor in reducing the cost of production, and it is for this purpose that we have made reference to it. The characteristic of modern manufacturing activity is the steady decline in cost of production in every department. A wide field is open to enterprise and skill in the reduction of the cost of fuel. Authorities differ as to the permanency of the natural-gas supply, and this very feature is stimulating capital to find artificial substitutes. Within the past week or so two companies have been formed for the introduction of artificial fuel upon a large scale in several of the large manufacturing cities. Natural-gas companies are not asleep: they have been extending their lines in Pennsylvania and Ohio. A thirty-six-inch pipe has been laid a distance of five miles, and is the largest in the world; this pipe has been laid in the city of Pittsburgh. Another line has been laid from Murraysville, a distance of eleven miles. Several eight, ten and twelve inch lines have also been laid. A twenty-inch pipe, twelve miles long, connects Murraysville with a town called Grapeville, which promises to be a thrifty, industrial centre. Two ten-inch pipes have just been laid across the Alleghany River. near Pittsburgh. During the past year another company made three thousand contracts to supply private houses. Schemes are under consideration for extending the natural-gas supply from cities now remote from sources of supply. A new field has been developed in Kentucky, and a pipe-line is to be laid at once to reach to the nearest manufacturing centres. In other directions there is no declining tendency. The cost of labor in nearly all industrial centres will likely remain the same.

The cost of iron, steel, lumber, petroleum, leather, coal, iron and wood-working machinery, shop work, including all kinds of boiler and engine work, as well as tools and implement works, will remain at the present level at least. In some directions prices are going upward. The only present advantages to be found in the direction of lower prices are in the cost of transportat on and in fuel. Leading lumber authorities state that the most encouraging feature of the present situation is the stability and upward tendency of prices. Surplus stocks are light. Throughout the West the demand has been steady and large all season. Both East and West dealers have reported a steady depletion of their stocks. The distribution of lumber throughout the West is considerably hindered by the scarcity of cars. The improvement in cities like Omaha, Kansas City, St. Louis, Minnesota and many other western and northwestern cities has been enormous and profitable for active building operations. Receipts of lumber at Chicago this year have been more than 130,000,000 feet, more than up to same time last year. Throughout the West there is a steady distribution of lumber of all kinds. Southern supplies are coming forward liberally. There is a very active competition in the southwestern section of the country due to the multiplication of saw mills and planing mills. Throughout the country lumber manufacturers expect to maintain present rates of prices throughout the winter, and enter upon the spring trade with moderate supplies, a good demand and bright prospects. The large crops of cereals is already having its effect upon those industries which look to the agricultural regions for their markets. For some months past there has been a lull in the machinery and implement branches. Within one or two weeks several of the agricultural implement establishments in the West have booked large orders for winter work. This is especially noticeable in wood-working machinery and in establishments which turn out small steam engines. It is also observable throughout the Western shops where machinery is supplied to be operated by gas or electricity. As so often stated, the demand for machinery and mechanical appliances is fully as large at this time as it has been for years. There is a general displacement going on of old machinery for new, because of the economies being brought about by improvements in machinery. The locomotive works throughout the country have booked large orders during the past thirty days. Four firms are working day and night. Within the past three weeks a number of car-building works have started night-work. A great many orders are coming in and railroad companies are in a position where they will be obliged to place large car-building orders before the close of the year.

The railroad situation is brighter upon the surface than beneath it. The gross earnings are large, but the net earnings are small. The bulls have been endeavoring for three months to so manipulate stocks and railroad returns, as to induce the outside public to rush in and seek to buy They have not accepted the invitation and there will be no participation in stock speculation this fall by the outside public. A good deal of uneasiness arises on account of the moderate earnings (net) but in the long run the influences of the reduced earnings will be healthful rather than the reverse. As intimated recently, a good deal of new railroad work is going on. Large rail contracts have not yet been placed. The managers of iron and steel works are declining to enter into heavy contracts for late delivery. Textile manufacturers are generally complaining of small orders. The desire of dealers is to not go into debt, as long as it is possible for legislative interference to suddenly depress the market value of stocks in hand. Distributors of all kinds of textile and manufactured products throughout the West are buying and carrying as light stocks as possible on this account. There is a general anxiety among borrowers and business men carrying stocks on credit to make prompt payments. The possibility of a reaction and a depression seems to be widely entertained. Failures this year are in point of numbers but little in excess of last year. The figures being 7,677 and 7,310 respectively to this date. In money markets there is a decided tendency toward a further rise of rates. The movement of funds to the interior is heavy and for systems along the Atlantic coast. The demand for first-class bonds continues large among the professionals. There is an abundance of money throughout the East waiting permanent investment and less than usual seeking purely speculative channels. The total East-bound rail shipments of bread stuffs from Chicago for last week reported was 30,331 against 25,373 tons for same week last year. There has been an advance in freight rates between Chicago and other Western cities of from forty to sixty cents on first class railroads. Rates to intermediate points will be advanced next Monday. There are prospects for a general harmonizing of interests since the Canadian Pacific and the Soo lines have joined in the upward movement.

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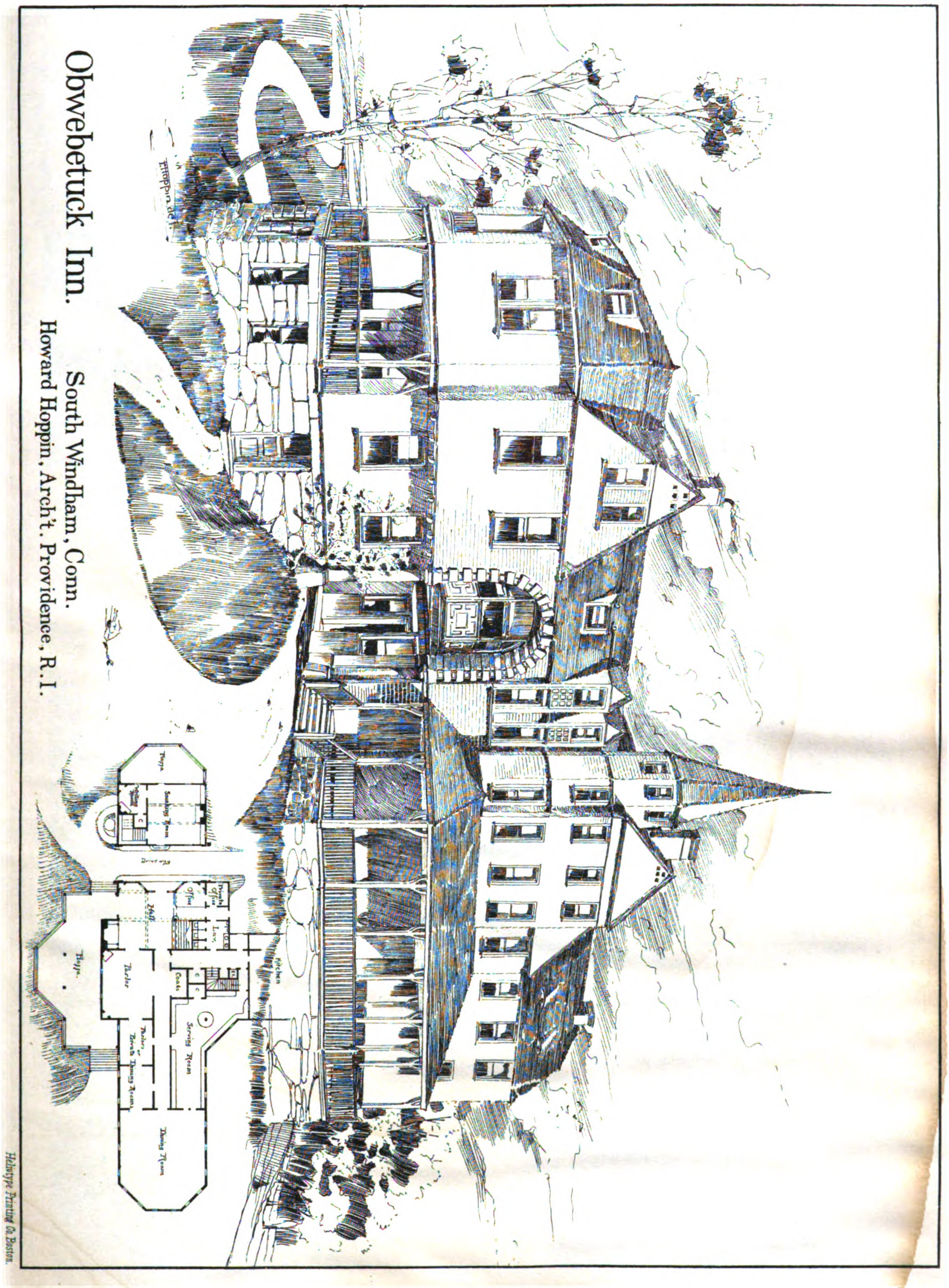

Obwebetuck Inn. South Windham, Conn.
Howard Hoppin, Arch't. Providence, R.I.

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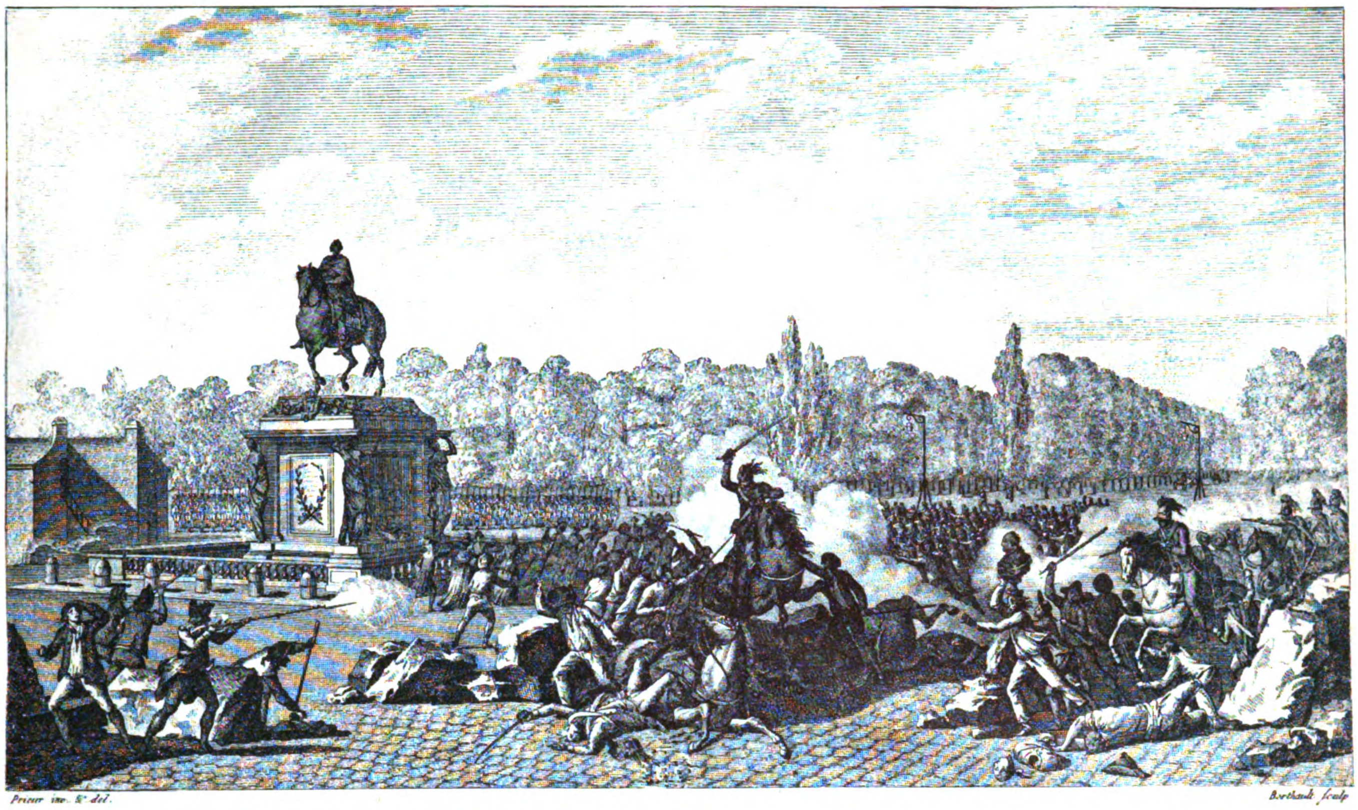
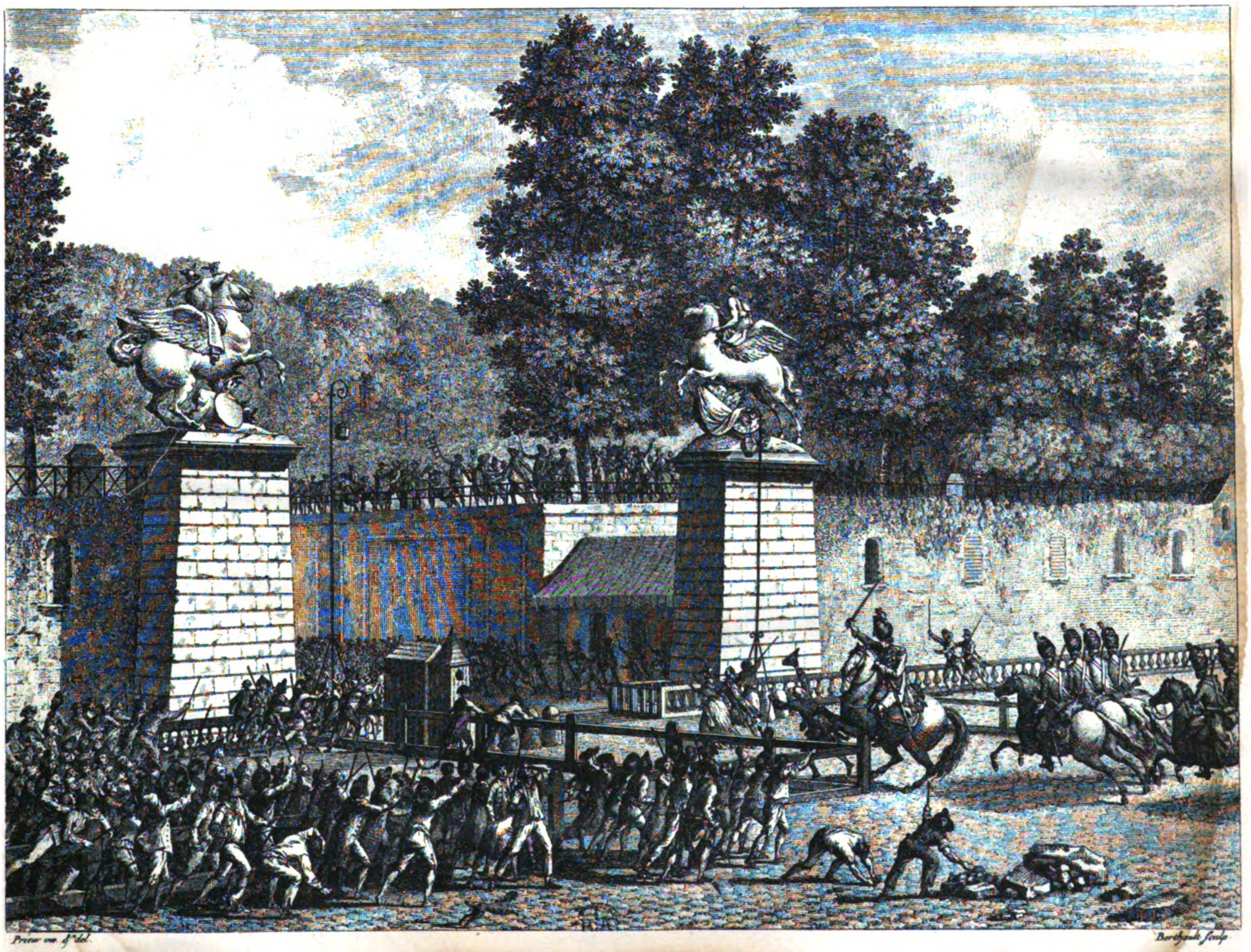


LES BUSTES DE M^RS D'ORLEANS ET NECKER PORTÉS A LA PLACE LOUIS XV.

le 12 Juillet 1789



M^R. DE LAMBESC ENTRANT AUX TUILERIES, AVEC UN DÉTACHEMENT DE ROYAL-ALLEMAND

le 12 Juillet 1789.

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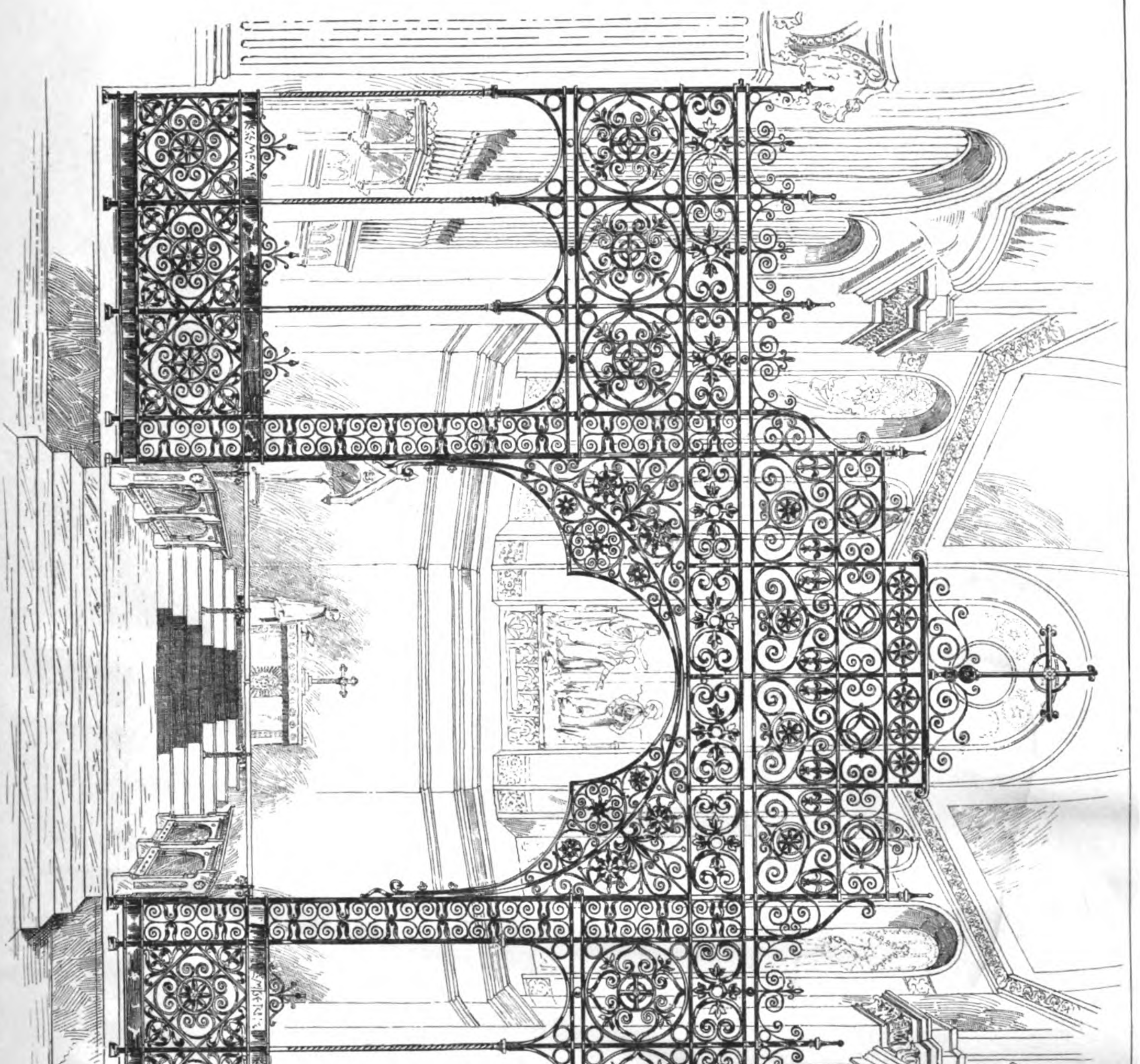

Rood-Screen for St Johns Cathedral. Denver. Colo. Designed by Chas. R. Lamb.

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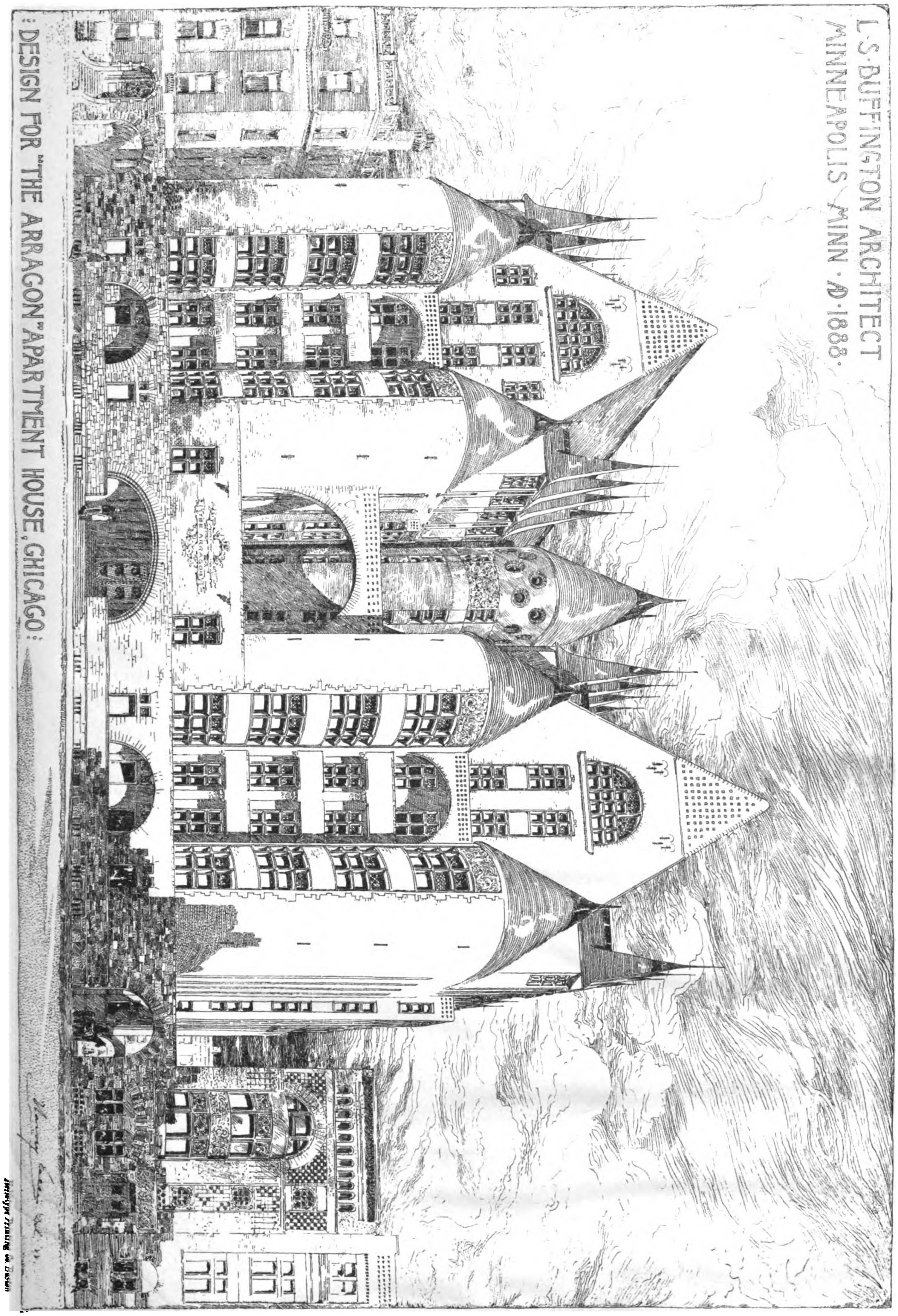

: DESIGN FOR "THE ARRAGON" APARTMENT HOUSE, CHICAGO:

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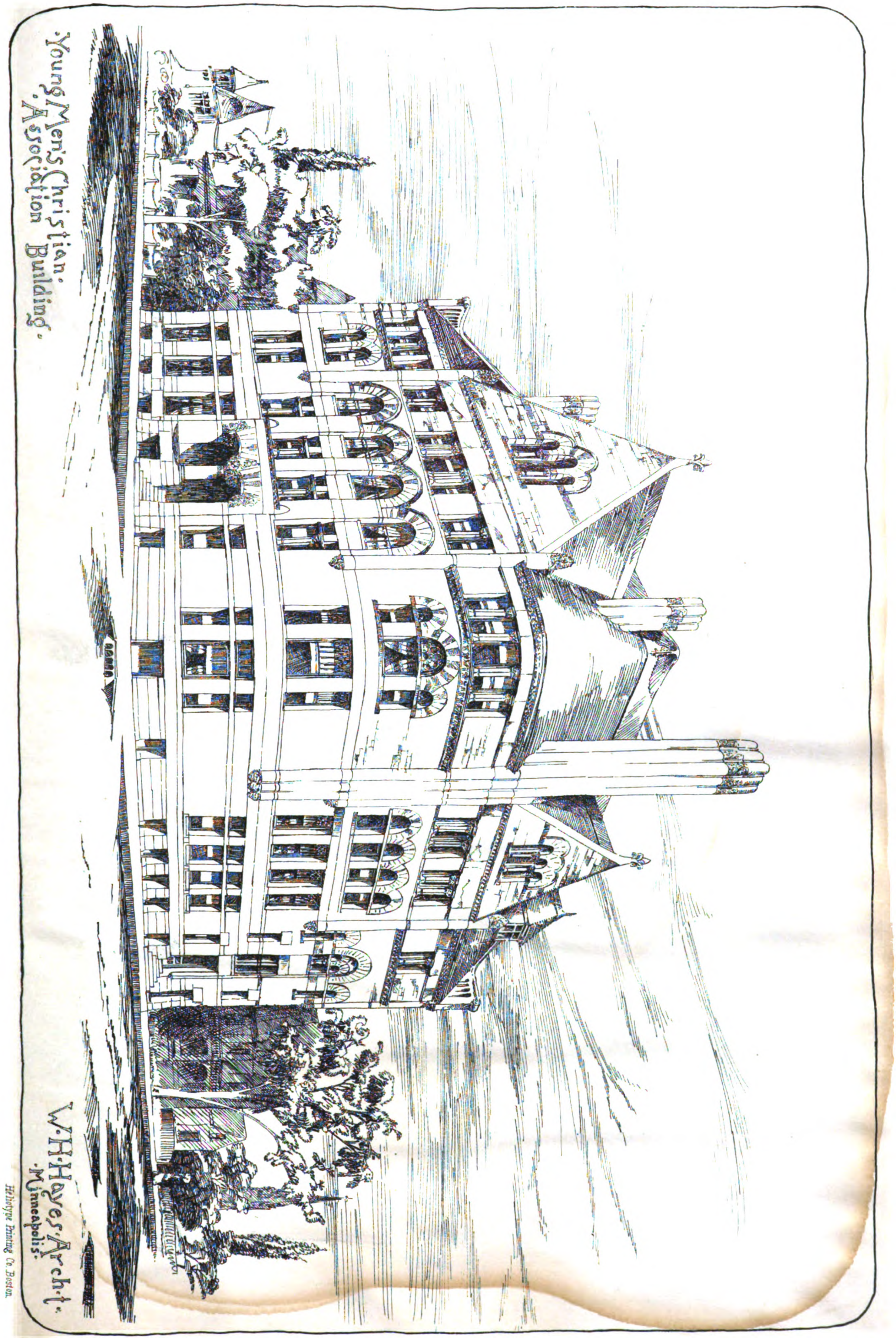

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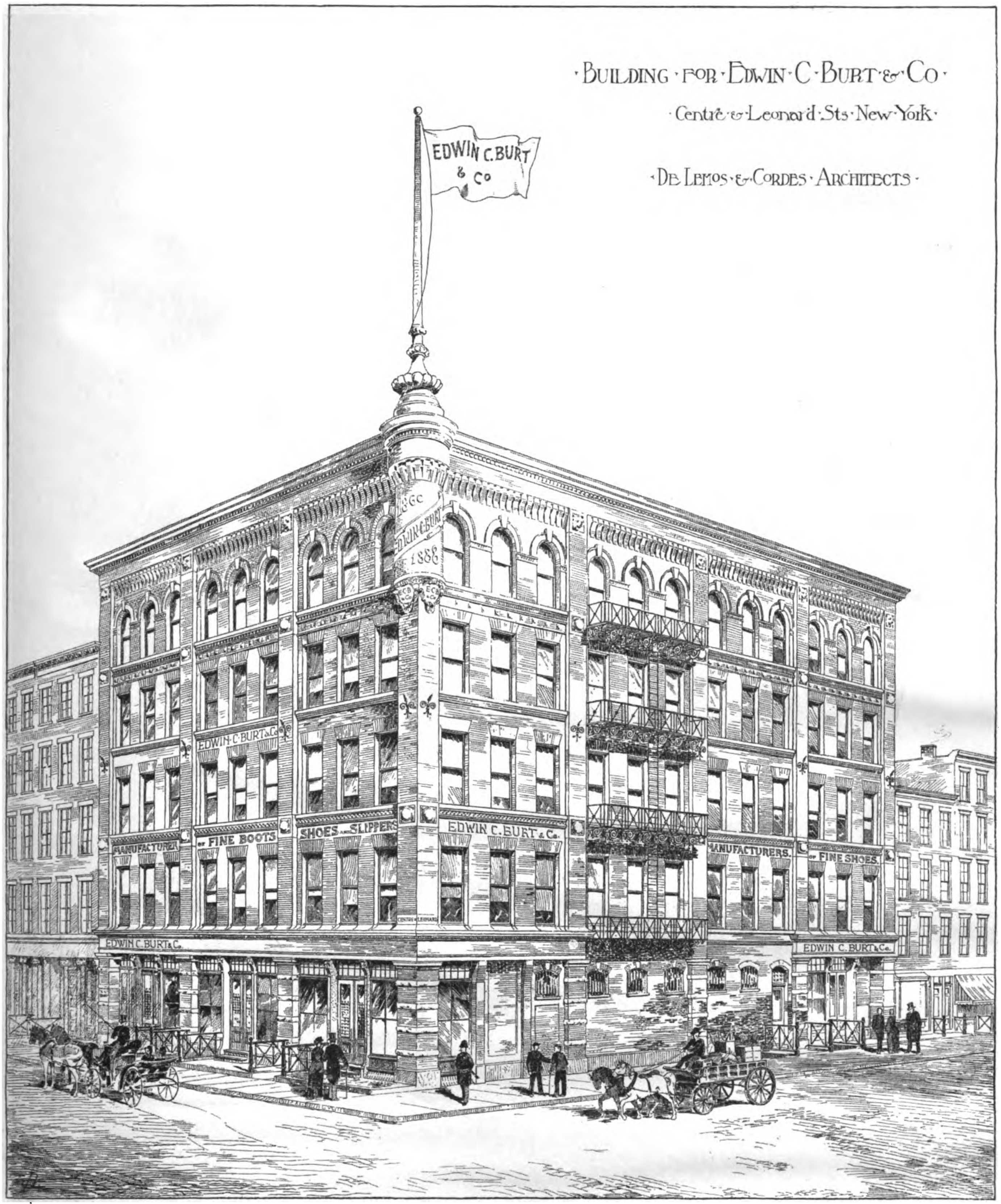

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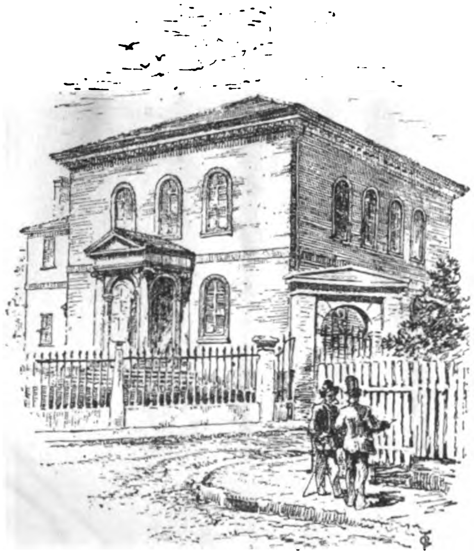
Hazard House, Newport, R. I.

Trinity Church, Newport, R. I. (1724-25.)

Redwood Library, Newport, R. I. (1748-50.)



Jews' Synagogue, Newport, R. I. (1762.)

"Whitehall," Newport, R. I.

NEWPORT, R. I.

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THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIV. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 670.

OCTOBER 27, 1888.

Entered at the Post-Office at Boston as second-class matter.

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THE New York *Times* has recently published an editorial article upon the price of iron beams, which shows the severity of the tax paid by American consumers of these all-important structural members, partly through tariff legislation, but much more through the combination of manufacturers, less forcibly than it deserves. The duty upon rolled-iron beams is now a specific one, of twenty-eight dollars a ton. This the *Times* calls equivalent to an *ad valorem* duty of eighty per cent. Instead of eighty, it is nearer one hundred and fifty per cent, as is easily shown. The latest quotations we have at hand for rolled-iron beams, "*fers à planchers*," in France and Belgium, date from the latter part of September, 1888. In these the French current price for such beams is given at thirteen francs per hundred kilogrammes. One hundred kilogrammes is two hundred and sixty-eight pounds, and at five and one-fifth francs to the dollar, which is about the present rate of exchange, the cost of French beams, in our weights and measures, is ninety-three hundredths of a cent per pound. In Belgium such beams are cheaper than in France, the quotation at the same date being one hundred and seventeen and one-half francs per metric ton, of two thousand six hundred and eighty pounds. This, reduced to American standards, is eighty-four hundredths of a cent per pound. We do not know whether the United States Custom House calls a ton two thousand or twenty-two hundred and forty pounds. If the former is the rule, the duty of twenty-eight dollars a ton amounts to one hundred and sixty-seven per cent on the original cost of Belgian beams; if the import be reckoned on the "long" ton, it is about one hundred and fifty per cent *ad valorem*, the average being nearly double what the *Times* calls it. It is understood, of course, that we have nothing to say as to the propriety or impropriety of imposing such a duty. That is a question of the development of native industry, with which we have nothing to do; but while the matter is under discussion it is important to have the facts correctly stated. The *Times* further mentions that, as we all know, the American rolling-mill combination has fixed the price of its beams at three and three-tenths cents per pound, or about four times the cost of similar beams in Belgium, and that, after paying duty, freight, insurance, brokerage and charges, the foreign beams can be delivered in this country at about six-sevenths the price of those rolled here. It seems to think, however, that they are rarely imported, which is a mistake, many tons of them being used in the seaport cities every year. They are easily distinguished, being, as a rule, less carefully rolled and smoothly finished than the best American beams, and may be found in many new buildings by those who are curious enough to look for them.

A GOOD illustration of the worthlessness of official inspection of buildings is to be found in the report of the inquest upon two workmen who were recently killed by the fall of the fifth floor of a building in New York, upon which they were at work. The first witness called was the deputy inspector in charge of the district, who testified that he went every other day to the building where the accident occurred, and that ten days previous to the accident everything was going on properly. The coroner seemed to think that the inspector ought to know something about the work on the day of the catastrophe, and questioned him, when it appeared that he had two hundred and ninety buildings to supervise, and could only give a hasty look, two or three times a week, at each one. Although it is obviously impossible for any man to see much of what is going on in two hundred and ninety buildings at once, the New York inspectors acquire a remarkable quickness in judging of what they do see. Another inspector, being called in the same case, testified unhesitatingly that in his opinion the fall was caused by piling too many bricks on the upper floor. The foreman doubted this, and ascribed the accident to the "jarring" caused by the hod-elevator; but by further evidence it appeared that the hod-elevator had been hired by contract, and the contract of lease expired that day, so that it seems altogether probable that the last moments of the lease were utilized to hoist as many bricks as possible to the upper floor, and that the inspector's surmise as to the result was the correct explanation of the accident.

A REMARKABLE, not to say suspicious, story of archæological discovery comes from Saïda, the ancient Sidon, in Phœnicia. According to the narrative, which *La Semaine des Constructeurs* quotes from the *Bosphore Egyptien*, a certain M. Durighello was recently digging in the ruins of Sidon, when he came suddenly upon a wall, buried several metres below the surface of the earth. There was nothing whatever on the surface to indicate that anything of interest lay beneath, but M. Durighello, pursuing his investigations, came upon a door in the wall, which had been blocked up with masonry, and, on being cleared, admitted him to a very strange and curious place. He soon discovered that he had found his way into a subterranean temple of Mithras, which had been purposely built underground by the priests after the prohibition of the Mithraic worship by Constantine, in order to avoid the observation of the Roman police. The concealment had been effectual, and after the priests, on deserting the temple, perhaps to go in search of worshippers, had built up the door, no one had entered it until M. Durighello's good fortune had brought him to it. On breaking through, he found himself in a long corridor, partly filled with earth which had fallen in from above, and lined with niches, in which were fourteen marble statues, representing warriors in menacing attitudes. Not deterred by these objects, the explorer passed through the corridor, and found himself in a "vast circular hall," covered with a polygonal dome, springing from twenty-four coupled columns. In front of each pair of columns was an altar, and by each altar a sort of marble bedstead. The altars were ornamented with the signs of the zodiac, sculptured in low relief, and on the walls, between the pairs of columns, were represented scenes very inappropriate to the stern military virtue enjoined upon the disciples of Mithras. Around the room were scattered candelabra, in marble and bronze, of wonderful beauty, and the floor was paved in mosaic of colored glass, inlaid with gold. In the middle stood a gigantic bull of marble, with horns covered with gold plates, and in front of the bull was a staircase, which led down, through a narrow opening, to seven consecutive subterranean apartments, each of which was a little smaller than the preceding one, while the walls of all were almost concealed by altars, groups of statues, and ornaments of marble, ivory, silver and gold. It is hardly necessary to add that a choice selection of these objects is now on exhibition in Paris, and that a wealthy amateur might possibly be able to secure specimens. So far as architects are concerned, while few of them could afford to buy such costly bric-à-brac, a good many would pay something for information as to how the priests of Mithras managed to construct a "vast polygonal dome" underground, without attracting the attention of the "Roman police" on the surface, or how the excavated material was disposed of without the knowledge of the same vigilant officers.

THE opening of the great Asiatic Railway has just been celebrated at Samarcand, in Bokhara, about three hundred miles from the Chinese frontier, and three hundred and forty from the boundary of British India. This is the present terminus, but an extension to Tashkend, two hundred miles

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further north, has already been surveyed. Although constructed for military purposes, the railway will probably be utilized to develop the country commercially, and under the military administration some experiments have been made in irrigation, which show portions, at least, of the arid country through which the road passes to be capable of extraordinary fertility. Near some of the rivers, where systematic irrigation has been carried on, nine crops of clover are obtained annually, and cereals produce a hundredfold. Although the ties, as well as the rails, tools, rolling-stock and a part of the provisions consumed by the workmen, were brought from Russia, the construction was pushed with great economy, as well as rapidity, nearly four miles of track having often been laid in one day, while the total average cost of the line, including land damages, track, stations, rolling-stock and other equipment, and telegraph line, having been only about twenty-six thousand dollars a mile. One of the most serious items of expense was for the provision of a regular and sufficient water-supply in that desert region, for all the stations, repair shops, and workmen's settlements, but everything was done in the most thorough manner, all the stations, as well as the barracks for the military guard, which were necessarily attached to the stations, being built of stone. The method of laying the track was devised with great ingenuity, and carried out with military precision. A permanent construction train was arranged, conveying two crews, each consisting of four or five hundred native laborers, with a hundred and fifty soldiers to act as guards and overseers, and fitted with sleeping berths, kitchen and hospital cars, travelling blacksmith and machine shops, and provision-cars, and attended by a private train of five or six cars, which served as the dwelling of General Annenkoff and his suite. Every five or six miles a siding was built, and when the day's work began, the construction train was transferred to the siding, to make room for the track-laying train, which was pushed to the extreme front of the line. The track-laying train consisted usually of nine platform cars loaded with rails, eight loaded with ties, four with spikes, fish-plates and other accessories, and a dozen or so with material for stations and bridges, and provisions and water for the workmen; the whole being just sufficient for a mile and a quarter of track. These trains were loaded at supply-stations on the finished part of the line, and sent forward at regular intervals, and three of them were often required in a day. In order to unload them quickly, and with the least loss of time in handling and transferring materials, General Annenkoff, after some experience with the usual method, of taking the rails and ties from the sides of the cars, loading them on carts, or on the backs of camels, and transporting them to where they were wanted, equipped all the cars carrying ties and rails with runways on each side, fitted with rollers, and nearly meeting at the ends of the cars; so that the rails and sleepers, instead of being thrown overboard, and then picked up and carried where they were wanted, were simply shifted to the runways, and rolled rapidly forward to the front of the train, where they were immediately laid, or taken on trucks, if required, and carried to some point in advance.

THE work of preparing the road-bed for the track was carried out mostly by native workmen. With the true Russian tact in managing barbarians, General Annenkoff contrived to get very good service from the half-savage Tartars of the country at a cost of about ten cents a day per man. His first step was to establish confidence by paying the men their wages at the end of each day. As few of them had probably ever seen so large a sum as ten cents before, this proved very attractive, and he found no difficulty in keeping a force, amounting sometimes to thirty thousand men, contented and industrious. As with all savages, however, he found it necessary to allow the nomads to carry earth for the embankments in bags or rude buckets. Any endeavor to persuade them to use more efficient apparatus would have provoked a rebellion, and he was wise enough not to attempt it. It is said that the engineers of the Mexican Central Railroad, observing that their Indian workmen moved material for the embankments by carrying it in baskets on their heads, sent North for wheelbarrows, intending at once to lighten the labor and improve the efficiency of their men. The docile natives received the wheelbarrows gratefully, but insisted on using them as baskets, filling them with earth, hoisting them with great exertion on their heads, and carrying them to the place appointed for depositing their burden. The less amiable Tartars would have been likely to mount their camels and desert their work in a body on the appearance of so offensive and unprecedented an object as a wheelbarrow, and General Annenkoff was able to comfort himself with the low rate at which his labor was purchased for the lack of scientific economy in using it. The cheapness of labor enabled him to try an experiment, which is worth remembering by those who are obliged to carry out such work rapidly, in the establishment of a reserve force of men, whom he could send at a moment's notice wherever they might be wanted, to supplement the work of the regular crew. In carrying out an extensive piece of construction, both economy and rapidity depend greatly upon the certainty with which all parts of the work are kept along together. In ordinary cases, the uniform progress of operations is continually interfered with by sickness or desertion among the men in one crew or another, or by miscalculation as to the difficulty to be met with, or the time to be occupied, in some portion of the work, and one crew often cannot be restored to efficiency at the expense of the others without dislocating the whole system of operation. To keep a few men in readiness to take the places of absentees, or to strengthen a crew inadequate for its duty, would often be a wise economy, but the reluctance of employers to maintain men in idleness to provide against the possibility of their being needed is so great that hardly any one but a military engineer would have thought of it.

THE *Scientific American* mentions that some experiments have recently been made at Alessandria, in Italy, to test the effect of colored light upon the insane. It has long been known that a free exposure to sunlight or diffused daylight is very tranquillizing to the nerves, but the physicians at the Alessandria asylum have gone farther than this; and distinguish between the effects of different colors in the light. Rooms were selected in the asylum, having as many windows as possible, and the sashes were filled with glass of various colors, the walls and woodwork being painted to match the glass. A patient suffering from melancholia, who refused to eat, was placed in one of these rooms, with walls and windows of a bright red. After three hours' exposure to this influence, he became cheerful, and asked for food. This, by the way, is a more significant circumstance to a physician than it would be to a layman. Most of us would say that any one, sane or insane, locked up for three hours in a room of any color, would be ready for some food at the end of that period, and would show a certain cheerfulness at the prospect of getting it; but with the insane whose malady begins with melancholia, the refusal of food is the earliest and most common, as well as most dangerous symptom, and is generally persisted in until nourishment has to be administered by force, so that the removal of this fancy, and the restoration of a healthy and spontaneous desire for food, in such a patient after a no more heroic treatment than a few hours' exposure to a certain kind of light, is certainly a fact worth recording in the annals of medicine. As a further test, another melancholy patient, who always kept his hands over his mouth to shut out food and air, was placed in the red room, and soon began to improve, and the next day had so far forgotten the hallucination which condemned him to self-starvation that he ate with a hearty appetite. Another patient, a violent maniac, was placed in a blue room, and became quiet in an hour; while a fourth was completely cured after passing a day in a violet-colored room. It is a pity that the accounts of the experiments are so meagre, but we may hope that they will be continued, and facts accumulated, until some reasonably safe inferences can be drawn from them. Although the medical journals attribute the improvement of the patients rather to the novelty of the sensations produced by the colored rooms, which distracted their attention for the moment from their own fancies, it is by no means unreasonable to suppose that the color may have been directly connected with the result in each case. Apart from the soothing effect of light of any kind, we know that the color sense may be the medium for the production of strong impressions on the mind. In a person in whom this sense is developed, the sight of a beautifully colored object excites, not mere intellectual pleasure, but a covetous appetite, which is more than half physical, and pursues its object as selfishly and impatiently as the other instincts of the senses. In fact, the color-desire overpowers for the time all others, and its gratification yields such intense pleasure that one can perhaps understand the sort of nourishment which the diseased mind might obtain from it, and see how strong doses of one color or another might prove useful where the condition of the recipient mind was so disturbed as to be incapable of appreciating perfect harmony.

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BUILDERS' HARDWARE.[1] — X.

DOOR–SPRINGS, CHECKS AND HANGERS.

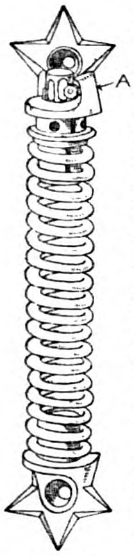

Fig 116. Star Door-spring. Van Wagoner & Williams Co.

THE simplest form of door-spring is a straight spiral coil of wire attached to the door and to the jamb, and drawing the door shut by a direct pull.

Such springs, of course, are used only on common work, though occasionally a spiral spring is used for gates in store-counters and railings, the spring being quite fine and long, and attached to the outside of the gate so that when the gate is closed the spring lies flat against it and does not show. The plain spiral spring is also a feature of many of the so-called door-checks; but in the line of springs which simply draw the door to there are several forms which are more convenient to use. Figure 116 illustrates the "Star" spring, manufactured by the Van Wagoner & Williams Company. In application one end is screwed onto the door near the jamb, and the other onto the jamb itself, the spring being at an angle rather than strictly vertical, and inclined towards the latch of the door so that when the door opens the spring acts both by resistance to compression lengthwise and by the uncoiling effect of the wire. The spring can be tightened in the same manner as the spring butts previously described, by turning the upper spindle to which the spring is attached, the pin *A* holding the spindle in position. Figure 117 illustrates another form of door-spring not unlike the foregoing in principle, though in this the spring acts entirely by its resistance to a twisting strain. In the cut, the lower screw-plate and hubs are shown drawn slightly away from the spring spindle, so as to expose the ratchets which hold the spring at any desired tension.

Figure 118 is a very strong form of direct-acting spring, intended to be used on fire-engine-house doors. As shown by the cut, the spring would force the door open, which, of course, is the intention in an engine-house; but the same principle could be applied to springs which are to close a door.

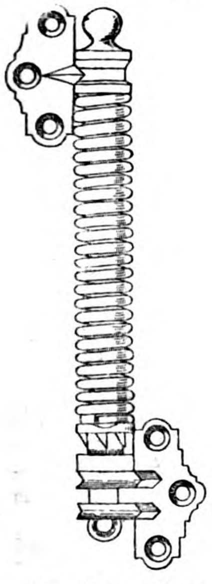

Fig. 117. Reliance Door-spring. Chicago Spring-Butt Co.

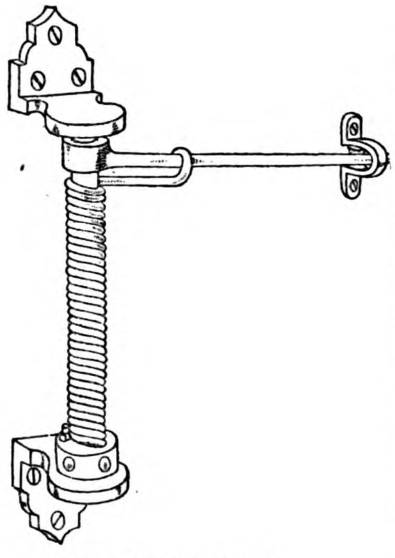

Fig. 118. Engine-house Spring. J. B. Shannon & Sons.

The spring is tightened at the bottom, and the upper lever-arm works through a staple and pulley-wheel on the door.

For light screen-doors a spring is sometimes used which acts by the twisting strain or torsion of a single steel rod, Figure 119. The two side pieces, *A A*, are screwed to the jamb. The upper flange is fastened to the door and has a catch fitting into the ratchets of a drum attached to the rod. As usually applied, the rod is not strictly vertical, but is at an angle with the door jamb, so that when the door is opened the rod is subjected to both a torsion and a bending strain. If the rod is well tempered, the bending strain, of course, gives it an added efficiency. Figure 120 is a form of torsion door-spring which is attached to the door, and is operated by means of a bent, hinged-lever fastened to the door-head. It is asserted that this spring has its greatest power just as the door is opened, and that the strain in the rod diminishes as the door is swung around.

The following table gives the average prices of the door-springs described:

TABLE OF DOOR–SPRINGS. — PRICES FOR A SINGLE SPRING.

Fig.	Name.	Laminated Spring.			Nickeled Spring.		
		Light.	Medium.	Heavy.	Light.	Medium.	Heavy.
116	Star door-spring..................	$ .15					
117	Reliance door-spring.............	1.20	$1.80	$2.80	$2.00	$2.80	$4.00
118	Engine-house door-spring, 24, 30 and 36-inch....................	3.00	4.00	5.50	4.75	6.00	7.75
119	Torry door-spring.................	.20		.40			
120	Peabody door-spring..............	.25	.25	.35			
121	Devore door-spring[1]..............						
122	Warner door-spring[1]..............						

[1] Not found in Boston market.

The principle involved in a reverse-acting spring butt, which has been explained in a previous chapter, can be applied to simple door-springs. Figure 121 shows a form which is made

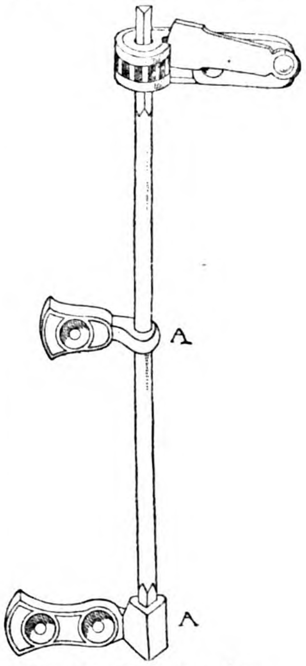

Fig. 119. Torry Door-spring. Van Wagoner & Williams Co.

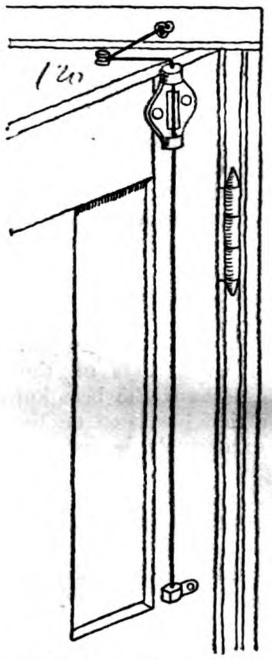

Fig. 120. Peabody Door-spring. A. W. Paine.

by the Freeport Hardware Manufacturing Company. This spring has a uniform tension, holds the door firmly when closed, and when the door is open about 120 degrees, the force of the spring is reversed and will hold the door open. Another advantage of this form is that the spring is easily unhooked and rehooked from the door, and also from the jamb with-

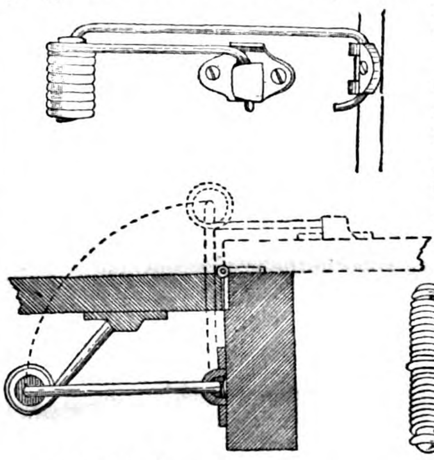

Fig. 121. Devore Door-spring. Freeport Hardware Manufg. Co.

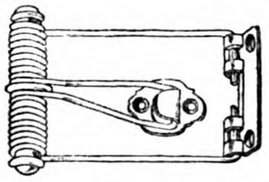

Fig. 122. Warren Door-spring, Warren Manufg. Co.

[1] Continued from page 182, No. 669.

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out removing the screws. The action of the spring will be understood from the illustration. Figure 122 shows a different form of spring, though on the same principle as the Devore. It has all the advantages of the one described and acts in precisely the same manner, though it is slightly larger. Both of these forms are exceedingly ingenious and efficient, and are sold a great deal in some parts of the country.

DOOR–CHECKS.

A door-check is understood to be anything which will hold the door either open or shut, or which will keep the door from slamming when closed. All the door-checks in the market are combined, directly or indirectly, with some form of door-spring. In some cases the spring is a part of the check, but more often the spring is a separate fixture, and is used as an auxiliary to the action of the check. One of the simplest forms of door-check is that shown by Figure 123. This consists of a strong band or spring of flexible steel which is attached by a proper holder to the head of the door-frame, so as to project about half an inch below the soffit. The door, in closing, catches on the shoulder at the end of the spring, forcing it up against the soffit of the door-frame, while the pressure of the spring on the head of the door keeps it from slamming, and in a measure also from opening too easily. The holder for the spring has slots *G*, instead of screw-holes, so that the spring can be moved up or down to any desired tension; while the upper slot *H* permits a further adjustment by moving the spring in or out. The retail price of this check is twenty-five cents each, japanned, or fifty cents, nickel-plated. For all ordinary practical purposes this door-check is as good a device as can be found, and is used a great deal on railroad cars, where there is constant liability to violent slamming. It will be noticed that the spring has a double power; first, by the friction of the door as it closes, and secondly, by the door coming in contact with the shoulder at the end of the spring. There is a special form of spring used to close this door consisting of a straight coil, with a hook on the jamb and a shoulder on the door.

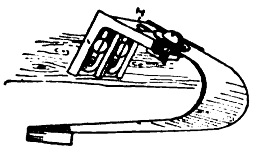

Fig. 123. Barlow Door-check. W. S. Barlow.

There are a few variations on the "Barlow" door-checks, but they all act on essentially the same principle, and this one will be sufficient for illustration. A very different kind of check is that which acts on the principle of a piston-pump, of which, perhaps, the best known is the "Norton" door-check. This article has been on the market a long time, and is used very extensively in some parts of the country. Figure 124 will give an idea of how it appears when set. The check consists simply of a plunger or piston working in a cylinder. Between the piston and the cylinder head is coiled a strong spiral spring, and the piston, as well as the cylinder, is pierced with a small hole to permit the air to escape. The cylinder is attached to the head of the door-frame, and is hinged at *A*. The piston-rod is connected by a hinged-joint with a lever *D* hinged to the frame, and a lever *G* attached to the door. When the door is opened, the piston is drawn out, the internal spring compressed, and the air enters through the holes in the piston and the cylinder head, filling the space beyond the piston. When the door is released, the spring tends to close it, the air behind the piston acting as a cushion prevents the door from closing too quickly or from slamming. The orifice in the cylinder can be made larger or smaller, thus regulating the speed at which the door shall close. The spring is made sufficiently strong to both close and latch the door after the air has escaped from the cylinder.

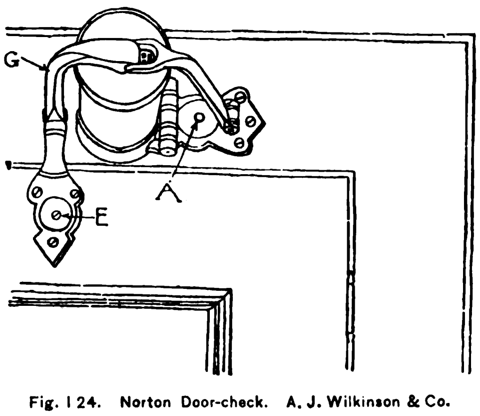

Fig. 124. Norton Door-check. A. J. Wilkinson & Co.

It will be seen that this door-check permits the door to be opened only about 120 degrees. This is usually more than enough for any doors requiring the use of a check, but a stop is always needed, otherwise the arm *G* may be broken.

A form of "Norton" door-check is also made to close the door from the outside. The action is exactly the same, except that the arm *G* is bent up and attached to the soffit, while the cylinder and *D* are attached to the door.

The "Norton" door-check is usually sold nickel-plated. The prices are as follows:

For screen-doors and doors not exceeding 2 feet 8 inches	by 1½ inches	$4.00
Doors not exceeding 2 feet 8 inches	by 2 inches	5.00
Doors not exceeding 3 feet	by 2½ inches	6.00
Doors not exceeding 4 feet	by 3 inches	8.00

A form of door-check, which has met with a great deal of approval, is the "Eclipse," manufactured by Sargent & Company. Figure 125 shows this check in position. It consists of piston secured to the head of the door-frame and working in a cylinder attached to the top of the door. The piston-rod is kept from lateral motion by a set-screw at one side of the foot, and a spring on the other, as shown by the figure, so that it can be accurately adjusted to meet the cylinder. When the door is opened, the cylinder is drawn entirely away from the piston, while the compression of the air in the cylinder when the door closes, prevents any slamming. The air escapes through openings in the end of the cylinder, so arranged as to be easily regulated. The piston in both the "Norton" and the "Eclipse" door-check have leather washers.

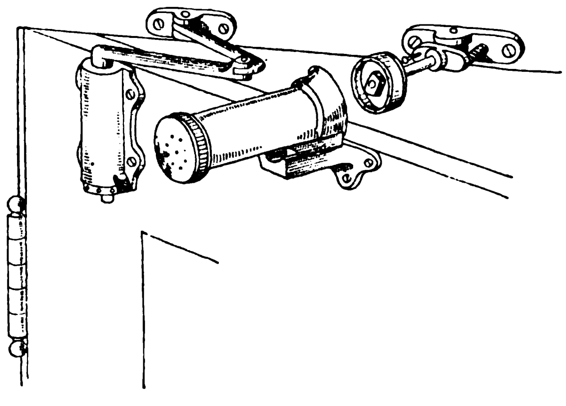

Fig. 125. Eclipse Door-check and Spring. Sargent & Co.

The "Eclipse" door-check can be used with any suitable form of spring butt, though the door-spring, shown by Figure 125, is especially made for this purpose by Sargent & Company. It consists of a strong spiral spring, cased in a cylinder and connected with the door-frame by a hinged bent lever.

The "Eclipse" checks and springs are finished in either Tuscan bronzed, bronze-plated or nickel-plated. The prices are as follows:

Door-checks.	Ordinary.	Heavy.	Very heavy.
Bronzed.	$2.10	$2 76	$4.00
Bronze.	2.40	3.30	4.60
Nickel.	4.20	5.00	6.30

Door-springs.	Ordinary.	Heavy inside.	Heavy outside.	Very heavy.
Bronzed.	$ .90	$1.25	$1.80	$2.52
Bronze.	1.10	1.50	2.10	3.00
Nickel.	3.00	3.36	4.00	5.00

The "Eclipse" check is applied to the outside of a door, if desired, a different form of holder securing the cylinder to the soffit of the door-opening, while the piston is fastened to the door.

It has been claimed that after being used for a certain time, the bearings in both the "Norton" and the "Sargent" door-check will wear loose, so that the air will escape too freely from the cylinders to form a reliable cushion; and several attempts have accordingly been made to produce a door-check in which the action should be regulated by the flow of some liquid, which would permit of metal instead of leather washers. Figure 126 illustrates one device on this principle. It consists

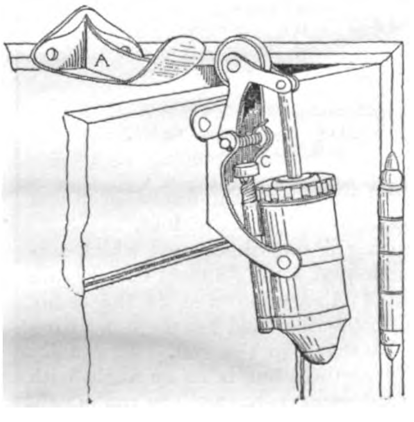

Fig. 126. House's Liquid Door-check. Nimick & Brittan.

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of a piston and cylinder attached to the door. The cylinder is pivoted so as to admit of a slight rocking motion, and the piston is hinged to a bent-arm, also pivoted just above *C*, and provided with a spring which serves to keep the piston drawn out. The cylinder is filled with oil, which flows back and forth through a small tube at the back, the rate of flow being regulated by a screw at *C*. When the door closes, the shoulder *A* on the door-head strikes against the bent arm and forces the piston down, the oil preventing any sudden slamming, while the rate of the flow through the tube below *C* determines the rate at which the door will close. This fixture retails at about $1 per set.

Such a form of check necessitates a spring-hinge, in order that the door shall be self-closing. Figure 127 illustrates a form of door-check manufactured by the same parties, which has a coiled spring inside the cylinder acting by means of the

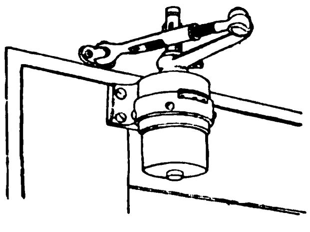

Fig. 127. House's Automatic Door-check. Nimick & Brittan.

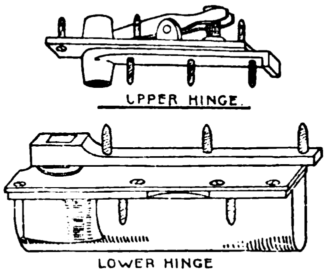

Fig. 128. Bardsley's Checking Spring-hinge. J. Bardsley.

hinged bent lever on the door-head. The interior of the cylinder is filled with oil, which checks the action of the door by flowing from one compartment to the other of the cylinder. The retail price is from $3.30 to $4.50 each, according to the finish.

Figure 128 is another form of combined door-check and spring, which is intended especially for double-acting doors, though it can be used for any door. No regular hinges are required with this fixture. The top of the door is held by a

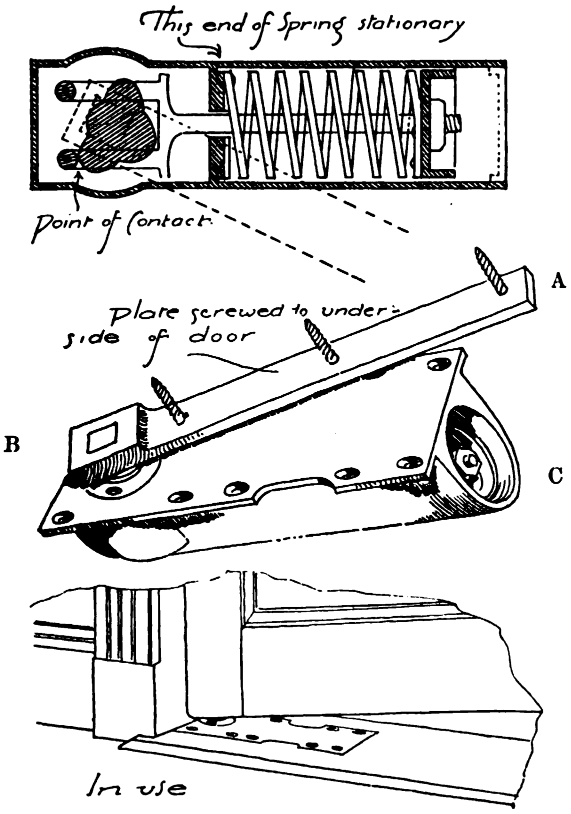

Fig. 129. Bardsley's Checking Spring-hinge. J. Bardsley.

species of pivot, fitting into a socket mortised into the top of the door, while the door-check answers for the lower hinge. The lever *A* is mortised into the bottom of the door, acting as a crank to turn the post *B*. The checking apparatus is encased in a box *C*, which is sunk into the door-sill and covered with a brass plate. Figure 129 shows a section of the box, which will illustrate more clearly its arrangement. The post *B*, when turned either way, moves a piston which travels in a cylinder completely filled with oil, in which is also a very heavy coiled spring whose action tends to close the door, while the oil prevents any sudden movement. The oil flows back and forth through a narrow aperture, the size of which can be regulated by a screw extending up through the covering of the box.

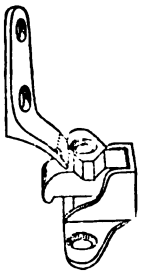

Fig. 130. Fray's Door-holder. J. B. Shannon & Sons.

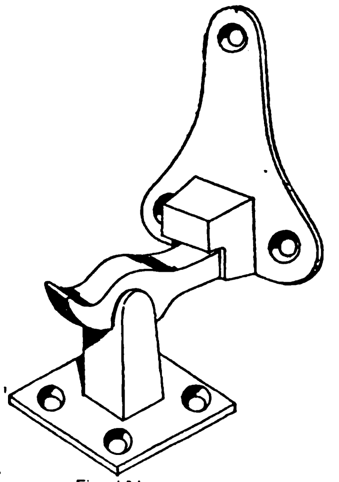

Fig. 131.

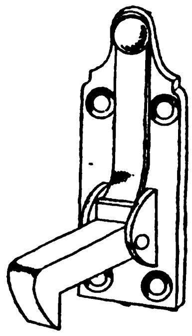

Fig. 132.

Door-holder. A. G. Newman.

This check is listed at $17 per door complete for a door of ordinary size.

Besides the door-checks which are automatic in their action, there are a number of devices for holding the door open or in any one position. Some of them are self-locking, but are arranged so that the door can be easily drawn to by slight pressure. Figures 130 and 131 are two varieties of this style of door-check. Another kind is made to absolutely hold the door fast when it is opened, so that in order to close the door the check must be released by hand: Figure 132 shows one of the many varieties of this form. It is varied by having a lever attached to the catch by which it can be more easily raised, and also by the catch being placed so as to act sidewise instead of vertically. Figure 133 is a form of catch which is intended to be attached to the jamb and to work over the top of the door, nearly all the other forms being attached to the door and working on a striker which is screwed to the floor. Figure

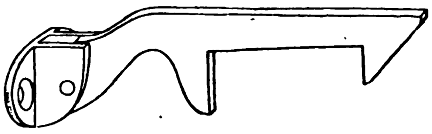

Fig. 133. Top Door-catch. P. & F. Corbin.

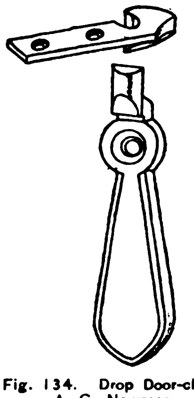

Fig. 134. Drop Door-check. A. G. Newman.

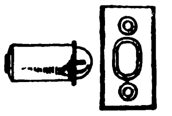

Fig. 135. Fray's Door-catch. J. B. Shannon & Sons.

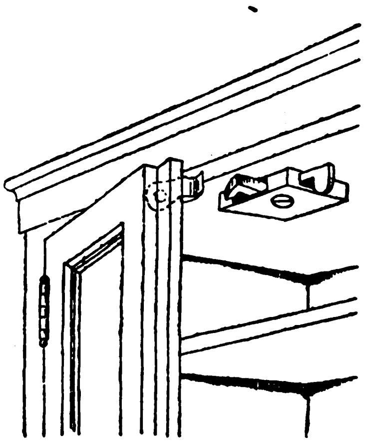

Fig. 136. Ross Inside Catch. Stoddard Lock & Manufg. Co.

134 is a self-locking form of door-check which is screwed to the door, catching onto a hook projecting from the wall. Figure 135 is a form of door-catch which is used for show-cases and closets, acting by means of a spring coiled inside the cylinder. Figure 136 is a spring-catch used only for light work or for cupboards.

[To be continued.]

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THE ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

HOUSE OF HENRY C. JACKSON, ESQ., BOSTON, MASS. MESSRS. ALLEN & KENWAY, ARCHITECTS, BOSTON, MASS.

[Gelatine Print issued only with Gelatine and Imperial editions.]

THE ATTACK ON CHANTILLY.

THE little equestrian statue at the right of this engraving, which is reproduced from "*Les Tableaux historiques de la Revolution française*," is the only trace it has been possible to find of the statue of the Constable de Montmorency, and this does not correspond with the printed descriptions.

THE PLACE LOUIS XV AND THE STATUE OF THE KING.

THIS engraving, which is drawn from the same source as the one above, is published in connection with the article on "Equestrian Monuments," elsewhere in this issue.

FURNITURE FOR THE CLUB-HOUSE OF THE NEW YORK CLUB, NEW YORK, N. Y. MR. R. H. ROBERTSON, ARCHITECT, NEW YORK, N. Y.

DESIGN FOR A SUBURBAN HOUSE BY MR. T. M. KELLOGG, BOSTON, MASS.

TWO TOMBS. MR. A. CUDELL, ARCHITECT, CHICAGO, ILL.

HOUSE FOR P. T. BARNUM, ESQ., BRIDGEPORT, CONN. MESSRS. LONGSTAFF & HURD, ARCHITECTS, BRIDGEPORT, CONN.

PROPOSED HOUSE, WORCESTER, MASS. MESSRS. BARKER & NOURSE, ARCHITECTS, WORCESTER, MASS.

ANCIENT AND MODERN LIGHT-HOUSES.[1]—XXIV.

LIGHT-HOUSE ADMINISTRATION (CONCLUDED).—THE UNITED STATES.

PRIOR to 1852 the Light-House Service of the United States was in the most inefficient condition; its shortcomings became so glaring that in 1851 Congress passed an act authorizing the Secretary of the Treasury to appoint a Board consisting of two officers of the navy of high rank, two officers of the engineers of the army, an officer of high scientific attainments, and a junior officer of the navy to act as secretary, whose duty should be to inquire into the condition of the light-house establishment of the United States and to make a detailed report to guide future legislation on the subject. With characteristic economy a further proviso was added to the act, providing that none of the above officers should receive any additional compensation for their services.

In obedience to the above act, the Hon. Thomas Corwin, then Secretary of the Treasury, appointed the following officers to form the above Board: Commodore William B. Shubrick, U. S. N.; Commander S. F. Dupont, U. S. N.; Brevet Brig.-Gen'l Jos. G. Totten, U. S. Corps of Engineers; Lieut.-Col. James Kearney, U. S. Top. Engineers; Prof. A. D. Bache, LL.D., Supt. Coast Survey; Lieut. Thornton A. Jenkins, U. S. N., Secretary. It would have been difficult to have selected a Board of more ability or probity. They entered on their duties with a patience and zeal which the importance of the subject required, and found that the existing system demanded a thorough purification and reorganization; that it was inefficient and wasteful; that the light-houses were neither properly built, located, nor distributed in accordance with the needs of commerce; that there was no efficient system of inspection and superintendence; that changes were constantly taking place in the aids to navigation without any official notice being given to the public; that the light-keepers in many cases were not competent, and they were never instructed in reference to their duties nor examined as to their ability to perform them, and, in short, that there was no proper system in the management of the light-house establishment of the United States.

This Board made a detailed report and recommendations to Congress and in consequence the following act was passed and is still in force: "The President shall appoint two officers of the navy of high rank, two officers of the Corps of Engineers of the army, and two civilians of high scientific attainment, whose services may be at the disposal of the President, together with an officer of the navy and an officer of the engineers of the army, as secretaries, who shall constitute the Light-House Board. The Secretary of the Treasury shall be *ex-officio* president of the Light-House Board." *Act approved 31 August*, 1852.

Further acts provided that the Board should e ect one of its members as chairman, who should preside at its meetings in the absence of the president; that the Board should meet on the first Mondays in March, June, September and December, and at such other times as the Secretary of the Treasury should require; that it should be attached to the office of the Secretary of the Treasury, and under his superintendence should discharge all administrative duties relating to the construction, illumination, inspection and superintendence of light-houses, light-vessels, beacons, buoys and sea-marks and their appendages, embracing the security of existing works, procuring illuminating and other apparatus, supplies and materials for building and for rebuilding when necessary and keeping in repair the light-houses, light-vessels, beacons and buoys of the United States; should furnish to the Secretary of the Treasury estimates of the expense which the several branches of the light-house service may require, and such other information as may be required to be laid before Congress at the commencement of each session; should make such regulations as they deem proper for securing an efficient, uniform and economical administration of the Light-House Establishment, and should arrange the Atlantic, Gulf, Pacific and Lake Coasts of the United States into light-house districts. An officer of the army or navy was required to be assigned to each district as light-house inspector, subject to the orders of the Board.

The President of the United States was required to cause to be detailed from the Engineer Corps of the army such officers as may be necessary to superintend the construction and renovation of light-houses. And all plans, drawings, specifications and estimates of cost of all illuminating and other apparatus and of the construction and repair of towers, buildings, etc., were to be prepared by the engineer secretary of the Board, or by such officer of engineers of the army as may be detailed for that service.

In conformity to the act of 1852, the President appointed, on October 9, 1852, the following gentlemen to form the first Light-House Board: William B. Shubrick, Commodore, U. S. N.; Samuel F. Dupont, Commander, U. S. N.; Joseph G. Totten, Colonel, Chief of Engineers, Brevet Brigadier-General, U. S. A.; James Kearney, Lieutenant-Colonel, Corps of Topographical Engineers, U. S. A.; Prof. Alexander D. Bache, LL.D., Superintendent U. S. Coast Survey; Prof. Joseph Henry, LL.D., Secretary Smithsonian Institution; Thornton A. Jenkins, Lieutenant, U. S. N., Naval Secretary; Edmund L. F. Hardcastle, Lieutenant, Corps of Topographical Engineers, Brevet Captain, U. S. A., Engineer Secretary. The Board elected Commodore Shubrick as its chairman.

The chairman and the two secretaries are the executive officers of the Board and are members of all standing committees. Under the direction of the chairman the naval secretary has charge of all matters pertaining to floating aids to navigation, to supplies, to nominations and salaries of light-keepers, to inspection of the returns and accounts of the inspectors and the appropriations, petitions, applications and correspondence connected therewith. The engineer secretary, under the direction of the chairman, has charge of all fixed aids to navigation, the preparation of plans, specifications and estimates relating to them, the purchase and repair of illuminating apparatus, the real estate of the Light-House Establishment, the manufacturing establishments of the Board at Staten Island and the general depot at that place, except that part of it relating to supplies, the nomination and salaries of employés of light-house engineers, the inspection of the returns and accounts of light-house engineers, and the appropriations, petitions, applications and correspondence in relation to the foregoing.

The United States is divided into sixteen light-house districts. The first to the sixth inclusive comprises the Atlantic Coast, the seventh and eighth the coast of Florida and the Gulf of Mexico, the ninth, tenth and eleventh the Great Lakes, the twelfth and thirteenth the Pacific Coast, and the fourteenth, fifteenth and sixteenth the Ohio, Mississippi, Missouri and Red Rivers.

To each district is assigned a naval officer as inspector, who has charge of all the floating aids to navigation, the supplies of the light-stations, the salaries of keepers, and the disbursement of funds relating to the above objects. The inspectors are required to inspect the lights at least once every three months, at which time they ascertain the condition of the station and report it to the Board. They also furnish to the engineer of the district notes of such repairs as may be needed.

Every district has also an engineer officer of the army as district engineer, though in some cases this officer may be in charge of two or three districts; his duty is to superintend the construction and renovation of the fixed aids to navigation; he visits the lights as occasion demands, furnishing the Board with a report of the condition and needs of the stations visited, and sending to the Inspector a copy of his notes so far as they relate to the latter's duties.

Both the district inspectors and engineers submit to the Board monthly and annual reports of the work done under their charge.

When the Board receives petitions for the erection of new lights,

[1] Continued from page 114, No. 663.

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the matter is referred to both the district officers for their views as to the necessity for the light and its proper location; the district engineer also submits plans and estimates of cost of the proposed structure; the Board then decides as to what should be done, and makes a report to Congress through the Secretary of the Treasury.

If Congress makes an appropriation, the district engineer is charged with the erection of the light, which must be done by contract, if possible, after due advertisement.

When the light-house is completed, the district engineer informs the Board, the keepers are appointed and the light-house is placed in charge of the district inspector.

Prior to completion, the Board issues a notice to mariners, giving a short description of the light and the probable date on which it will first be lighted.

The annual expense of maintaining the light-house establishment is approximately as follows, and is divided under the following heads:

Supplies. — $340,000. This is mainly for mineral-oil, but also includes cleansing materials, books, boats and furniture for stations.

Repairs. — $300,000. This includes the repairs of light-stations, the building of pier head-lights and the purchase of illuminating apparatus to replace that already in use.

Salaries. — $585,000. This includes salaries of light-keepers, fuel, rations and rent of quarters where necessary.

Light-vessels. — $215,000. This includes all expenses of maintaining, supplying and repairing light-vessels.

Buoyage. — $325,000. This includes all expenses relating to buoys, spindles and day-beacons

Fog-signals. — $60,000. This includes all expenses relating to the establishment and repairs of fog-signals and buildings connected therewith.

Inspecting Lights. — $3,000. This is to pay for the travelling expenses of the Board and for rewards for information as to collisions.

Lighting of Rivers. — $225,000. This pays for the establishment, maintenance and supply for the river-lights previously mentioned.

Surveys. — $2,500. This is to pay for the preliminary examinations of sites and for plans, for which estimates are to be made to Congress.

Total. — $1,415,500.

The total sum is never exceeded and frequently is not spent, in which case the balance on hand at the end of the fiscal year is returned to the Treasury.

Every new light-house is the subject of a special appropriation which is available until the light-house is completed, any balance remaining is turned into the Treasury and is not available for any other purpose.

The number of lights increases from year to year to keep pace with the needs of commerce. The following table shows the aids to navigation maintained by the United States Light-House establishment on June 30, 1887.

The Board at present has its offices in the Treasury Department at Washington, and for a number of years past has complained of lack of room.

The Board has had to move four times since its organization in 1852, each time with damage and loss to its archives, and delay and inconvenience in the despatch of its business, which is yearly increasing in size and importance.

It has petitioned to Congress for an appropriation to erect, on one of the Government reservations at Washington, a suitable building in which its office, its records, its library, its museum and its laboratory can find a permanent home.

Congress, so far, has not seen fit to grant this appropriation.

The Board has depots for supplies and buoys in various districts, but the most important one is on Staten Island, N. Y., in the Third District. It is the general depot for the whole United States; all the oil is sent there, tested and distributed, and from it are furnished nearly all the supplies for the other districts. The inspector of the Third District has charge of the above, while the engineer has charge of a well-appointed lamp-shop, blacksmith and carpenter-shop, where lamps, lanterns and general metal-work are made and repaired, oil-cans and boxes for mineral-oil manufactured, illuminating apparatus set up and tested prior to shipment, buoys repaired, photometric tests made, and, in general, the multifarious work done which the light-house service requires.

A large tender, the "*Fern*," distributes the supplies from this depot to the Atlantic and Gulf coasts. She is soon to be replaced by a larger vessel, as the needs of the service are rapidly exceeding her carrying-capacity.

The supplies for the Pacific Coast, for the lakes and for the rivers are shipped by rail and distributed by the tenders of the districts.

Wherever it is possible light-keepers are furnished with commodious dwellings of five or six rooms; where vacancies occur they are filled by promotion from keepers in service of a lower grade, and the Collector of Customs of the district nominates for the ultimate vacancy; his nominee receives an appointment as acting-assistant keeper, and if he proves satisfactory after trial, he receives an appointment as assistant-keeper.

Aids.	First district.	Second district.	Third district.	Fourth district.	Fifth district.	Sixth district.	Seventh district.	Eighth district.	Ninth district.	Tenth district.	Eleventh district.	Twelfth district.	Thirteenth district.	Fourteenth district.	Fifteenth district.	Sixteenth district.	Atlantic and Gulf coasts.	Pacific coast.	Lake coast.	Rivers.	Total for entire coast. 1887.	Total for entire coast. 1886.	Increase.
Electric lights	......	......	1	......	......	......	......	......	......	......	......	......	......	......	......	......	b1	......	......	......	1	1	......
First-order lights	2	4	6	5	6	5	9	2	......	......	......	7	5	......	......	......	39	12	......	......	51	51	......
Second-order lights	7	3	1	......	......	1	......	4	1	......	2	1	......	......	......	......	16	1	3	......	20	20	......
Third-order lights	5	1	5	3	......	4	4	4	8	6	8	3	1	......	......	......	26	4	22	......	52	52	......
Three-and-a-half order lights	......	2	1	......	......	......	......	......	3	1	4	......	......	......	......	......	3	......	8	......	11	11	......
Fourth-order lights	19	22	a33	12	32	8	6	14	26	23	24	9	7	......	......	......	146	16	73	......	235	231	4
Fifth-order lights	20	16	17	9	22	6	......	12	13	6	14	2	2	......	......	......	102	4	33	......	139	137	2
Sixth-order lights	1	6	33	3	14	7	1	2	17	20	20	......	......	......	......	......	67	......	57	......	124	122	2
Lens-lanterns	......	......	......	1	14	7	......	13	2	6	5	......	30	......	......	......	35	30	13	......	78	57	21
Range-lenses	......	......	6	8	2	1	......	......	......	......	......	......	......	......	......	......	17	......	......	......	17	17	......
River-lights	......	1	52	......	2	68	......	1	......	1	......	......	......	441	371	295	124	......	1	1107	1232	1227	5
Reflectors	......	9	......	8	4	16	......	2	......	7	......	......	......	......	......	......	39	......	7	......	46	44	2
Light-ships in position	......	8	7	3	......	3	......	2	......	......	1	......	......	......	......	......	23	......	1	......	24	23	1
Lighted buoys	......	......	......	......	2	2	......	......	......	......	......	......	......	......	......	......	4	......	......	......	4	2	2
Total lighted aids	54	72	162	52	98	128	20	56	70	70	78	22	45	441	371	295	642	67	218	1107	2034	1995	39
Fog-signals operated by steam or hot-air	10	7	11	3	1	......	......	2	10	1	14	12	6	......	......	......	34	18	25	......	77	76	1
Fog-signals operated by clock-work	7	8	37	8	54	3	......	6	3	5	3	4	2	......	......	......	123	6	11	......	140	139	1
Day beacons	95	58	44	2	13	29	27	13	......	......	1	41	38	......	......	......	281	79	1	......	361	321	40
Whistling-buoys	9	8	5	4	1	4	1	2	......	......	......	7	3	......	......	......	34	10	......	......	44	40	4
Bell-bouys	12	9	8	4	2	11	2	1	......	......	1	......	1	......	......	......	49	1	1	......	51	44	7
Other buoys	510	471	510	160	1006	265	200	89	49	167	135	57	172	......	......	......	3211	229	351	......	3791	3758	33
Total unlighted aids	643	561	615	181	1077	312	230	113	62	173	154	121	222	......	......	......	3732	343	389	......	4464	4378	86
Total number of aids	697	633	777	233	1175	440	250	169	132	243	232	143	267	441	371	295	4374	410	607	1107	6498	6373	125

a Including Blackwell's Island Light, not maintained by Light-house Board.
b Statue of Liberty, New York Harbor.

The salaries paid to light-keepers vary considerably, both on account of the importance of the lights and of the cost of living in different parts of the United States. The principal keepers at most of the first-order lights on the Pacific Coast receive $1,000 a year, while on the Atlantic Coast there is but one who receives so much, and that is at Minot's Ledge; he has three assistants at $550 each.

As a general rule the keeper of a first-order light receives from $700 to $800, of a second-order light from $600 to $700, and of the lower orders from $500 to $600. Assistant-keepers receive various rates of pay ranging from $400 to $550.

Captains of light-vessels receive from $750 to $1,000.

Keepers are required to be in uniform.

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At some stations difficult of access rations are furnished in addition to the salary, and most stations also receive an allowance of coal.

Neat libraries, of about thirty books each, are left at isolated stations and changed from time to time. D. P. HEAP.

[The End.]

EQUESTRIAN MONUMENTS.—IX.[1]

PERISHED MONUMENTS—THE FRENCH REVOLUTION.

Statue of Louis XV, by Bouchardon, in the Place Louis XV, Paris, France.[2]

THE statue of Henry IV on the Pont Neuf was not the only one that had to undergo the peril of shipwreck before reaching its destined resting-place, for one of the many statues of Louis XIV endured the same fate.

In 1716, shortly after the death of Louis XIV, the Etats de Languedoc voted to erect at Montpellier a bronze equestrian statue in his memory. The work was entrusted to two Flemish sculptors, Mazeline and Utrels, who were settled at Paris. In due time these men succeeded in producing an equestrian statue which measured nearly sixteen feet in height, and which, consequently, was no trifling affair to transport to the south of France. However, the group was boxed in a strong framework, and by aid of capstans and rollers was dragged through the streets and loaded on a boat which was towed down the Seine to Rouen. There the statue was transhipped to a vessel and proceeded down the river and along the coast to Bordeaux, when just as the vessel was entering the mouth of the Garronne it was wrecked and the statue was in danger of being a total loss. It was at length recovered, placed on a boat and towed up the Garronne and through the Canal Royal, ponds and other water-courses—which, owing to the farsightedness of Sully, already formed a fairly perfect system of inland waterways—to Montpellier. Here it was received with great public rejoicings, and the promoters of the enterprise were in such haste that they could not wait for the completion of the pedestal, but hoisted the statue to the top of the unfinished base, and then and there unveiled it. The place where this monument was erected, on the Promenade du Peyrou, is one of the ideal situations in Europe for a monument, and its fame is known to travellers.

Another posthumous equestrian statue of Loui**x** XIV, though it was ordered before the King's death, was erected in 1725 opposite the Palais des Etats, at Dijon by the Etats de Bourgogne. This was modelled by Le Hongre, sculptor to the king. In the Place Bellecourt, at Lyons, was destroyed in this same year an equestrian statue of Louis XIV by Desjardins of which as to its merits or its history little is known.

How it happens that any of the statues of royal personages escaped the iconoclasm of the unbridled revolutionists is not clear; but in all French revolutions the work of erasing the symbols of a previous condition of servitude has been done in a very unsystematic way, and though the traveller finds almost everywhere that the rabid subverser has been at work he finds the work fortunately scamped, and so it is that here and there on the Louvre still lingers the letter "N," and that in the inscriptions on public places the word "*Nationale*" has not replaced the word "*Imperiale*." Yet although some of the monuments of Louis XIV survive, others perished and amongst these the equestrian monument, the work of the sculptor Coysevox, which the Province of Brittany caused to be erected at Rennes in 1726, in the Place du Palais de Justice, eleven years after the death of the King—though the order for it had been given in 1685. All that remains of it are the bas-reliefs which decorated the pedestal and are now in the museum in that city.

Quite as much as his great-grandfather, Louis XIV, was his successor, Louis XV, fond of being immortalized in bronze and marble and so great was the number of statues that were erected to the glory of Louis "the Well-beloved," that their description and illustration furnished material enough for a very elaborate monograph. The most celebrated of these statues was the equestrian figure that was erected in 1763 on what is now the Place de la Concorde, a spot which is one of the important milestones in the world's history; for here the blood of some three thousand aristocrats was poured out under the falling knife of the guillotine, in expiation of the gross wrongs done by their caste upon the lower classes. But before the fateful invention of Dr. Guillotin could be set up in the Place Louis XV, Bouchardon's bronze equestrian statues of "the Well-beloved" must come down, and many of the men who helped to pull it down that August day may have had personal feelings of spite and revenge against the original which they could in this way mildly satisfy—the *Parc aux Cerfs* at Versailles was supplied from all grades of society and many a father, brother or lover had wrongs to avenge. What the Place de la Concorde now is with its seated statues of French Cities, its fountains and the obelisk of Luxor in the middle all travellers know; what the Place de la Revolution was the horrid page of history allows us to imagine; what the Place Louis XV was the illustrations—from engravings made about 1800—show. This latter name was once revived on the final overthrow of the first empire, but probably Louis XVIII did not think it wise to tempt another outbreak by erecting a statue to the fifteenth Louis.

The statue was commissioned directly after the Peace of Aix la Chapelle, which terminated the Austrian War of Succession, in 1648, when the people were not only grateful for peace but still felt much of their original enthusiasm for the young king whose vices and debaucheries were as yet somewhat veiled from public knowledge: his sobriquet had not yet been withdrawn from him. But in the fifteen years that elapsed before the statue was finished public feeling had probably undergone a great change, and though the ceremonial attending the unveiling of the statue was sumptuous, the enthusiasm of the spectators must have lacked the spice of personal admiration.

The work was entrusted to the architect Gabriel and the sculptor Bouchardon, who labored, it is said, with much perseverance upon the statue for more than twelve years, but if, as is likely, he was within the circles of court life it is probable that he proceeded about his task in a leisurely way. At his death in 1762, the monument was still unfinished, and had to be completed by the sculptor Pigalle to whom are to be credited the accessory figures of Strength, Wisdom, Justice, and Peace, which were placed about the pedestal and also, presumably, the bronze bas-reliefs which decorated its sides.

The monument was finally dedicated June 20, 1763, and consequently Louis in his classic garb, and his horse—which is said to have been really a fine piece of sculpture—had an existence of nearly thirty years before it was melted up and coined into pieces of two sous, on the theory, perhaps, that in this way the greatest number could profit by its downfall. The site was not allowed, however, to remain unadorned and a terra-cotta statue, by Lemot, of Liberty was soon set up where Louis's statue had been, and was at once christened "La Liberté de Boue."

Belonging to the same school, the same style, the same epoch was the statue of Louis XV, by Le Moyne, at Bordeaux, which was also destroyed at this time, and of which there remain only some bits of marble bas-reliefs preserved in the museum at Bordeaux. It is to be noted that all the statues of the Louis were designed as the central feature of a surrounding architectural treatment. It was the age of Le Nôtre and Mansart, and grandiose formalism pervaded the arts even as it did everyday life.

As Chantilly is not entirely beyond walking distance from Paris, it is probable that some portion of the same mobs that destroyed the monuments of Henry and the Louis, plodded over the roads that led thither, stopping at St. Denis on their way to vent their spite in demolishing the tombs of the many royal personages that had long made the abbey famous. As the favorite seat of the Condés, one of the most powerful and haughty families of the kingdom, there was every reason why the *sans culottes* should have a desire to pillage it, and there was even more reason, perhaps, why they should harbor—supposing that such a rabble had any real knowledge of past history—a grudge against the former and original owner of the place, Anne de Montmorency, Grand Constable of France, one of the most famous of French generals, who had the fortune to serve with distinction under Louis XII, Francis I, Henry II, Francis II and Charles IX. It is hardly supposable that the mob felt that they were called on to avenge the brutality with which Montmorency in 1548 put down a revolt that an obnoxious tax on salt had given rise to in Guienne; nor can any one believe that this rabble, whose fellows would shortly publicly abolish religion, included a large contingent of descendants of the Huguenots burning to repay in some

[1] Continued from page 184, No. 669.

[2] "*Monuments erigés à la gloire de Louis XV.*" *par Patte*, 1765.

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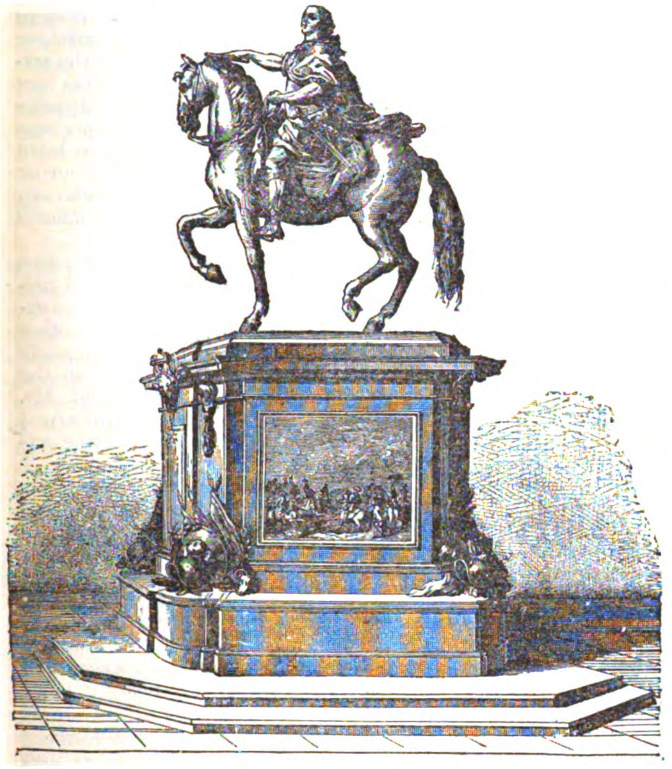
measure the harshness which he meted out to those unfortunate but valorous Protestants. Yet their exhilaration could not have been greater in either of these two cases when they espied on the esplanade the equestrian statue of Anne himself, and they probably accomplished its destruction with despatch and thoroughness, for no remnant of it remains. It was clearly the rider and not the horse that excited their fury, for the horses in the beautiful high-relief over the entrance to the famous stables of the Grand Condé were not injured.

Who was the sculptor of the statue of the Constable is not known, but as a description of it speaks of the horse as resting one of his fore feet on a helmet lying empty below him, it is probable that it was the work of an Italian, or, at least, of one who was familiar with



Statue of Louis XV, Bordeaux, France.[1]

Donatello's studies for his statue of Gattamalata. The rider was dressed in classic style, and the group was placed on a very lofty pedestal.

The Duc d'Aumale, who acquired Chantilly in 1830, and has spent immense sums on its restoration, a year or two ago placed in the same position an equestrian statue of the Constable, the work of the sculptor Paul Dubois.

PIERRE MAZELINE. Born at Rouen, 1633. Died Paris, 1708. He executed a statue of "Europe" and other works at Versailles. In the Church of St. Gervais, Paris, is his tomb of Michel le Tellier, and, in the Church of St. Roch his tomb of the Duc de Créquy. The equestrian statue of Louis XIV by Mazeline and Utrels was erected at Montpellier in 1717, and destroyed during the French Revolution.

ETIENNE LE HONGRE.—Born at Paris, 1628. Died 1690. Pupil of Sarrazin. He spent several years in Italy, and returning, was invited by Colbert to assist in the works at the palace of Versailes, where he executed a figure of "Air," the statues of "Vertumnus" and "Pomona," and a number of bas-reliefs. He designed the bronze equestrian statue of Louis XIV, erected in the Place Royale at Dijon. Among his other works were a part of the sculptures in the Mazarin College, now the Palace of the Institute.

MARTIN VANDEN BOGAERT (called Desjardins by the French).—Born at Breda Holland, 1640. Died 1694. Executed the celebrated pedestrian statue of Louis XIV, which stood in the Place des Victories, Paris, until the revolution, when it was destroyed. Also made the statues of "Evangelists and Fathers of the Church" at the College Mazarin, Paris, a statue of "Evening" for Versailles, a relief of "Hercules crowned by Victory," now in the Louvre.

LOUIS XV.—("Le Bien-aimé.") Great-grandson of Louis XIV. Born 1710. Became king in 1715. Ten years regency of the Duke of Orleans. Married Marie Leszczinska, of Poland. Wars of the Austrian Succession, and with England. Ruled by his mistress, Madame de Pompadour. Died 1774.

JACQUES ANGE GABRIEL,—The son and grandson of an architect; born at Paris about 1710. He attained the position of first royal architect, and built the Ecole Militaire at Paris, which was commenced in 1751. He erected a portion of the Louvre, also the two colonnades adjacent to the Place de la Concorde, which was also built from his designs, and was then called the Place Louis XV. Gabriel died in 1782.

EDIME BOUCHARDON.—Born at Chaumont (Haute Marne), 1698. Studied under his father, a sculptor and architect, and the younger Coustou. Grand Prize, 1722. His principal works are the "Apostles" in the Church of St. Sulpice, Paris; several statues at Versailles; "The Fountain" of Grenelle; "Young girl holding a stag by a cord," and "Cupid and Psyche" at the Louvre.

JEAN BAPTISTE PIGALLE.—Born at Paris, 1714. Died 1785. He was the son of a carpenter, but having a taste for art, studied under Robert le Lorrain, and then in Rome. His masterpiece is the monument erected by Louis XV to Marshal Saxe, in the Church of St. Thomas, at Strasburg. At Paris, his principal work is the tomb of Marshal Harcourt, in one of the chapels of Nôtre Dame. In the Library of the Institute of France is a nude statue of Voltaire, by Pigalle. He also made a statue of his patron, Madame de Pompadour, and one of Venus, now in the garden of Sans Souci, at Pottsdam. Pigalle was one of the most celebrated of the French sculptors of the eighteenth century.

JEAN BAPTISTE LE MOYNE.—Born in Paris, 1704. Son and pupil of Jean Louis LeMoyne, also a sculptor, and of Robert le Lorrain. Gained the Grand Prize by his bas-relief of the "Sacrifice of Polyxena." His works are a pedestrian statue of Louis XV for Rennes (destroyed); "The Death of Hippolytus"; "The Baptism of Christ"; some saint, at the Invalides; the tombs of Cardinal Fleury and Mignard, and many portrait busts. Died in 1778.

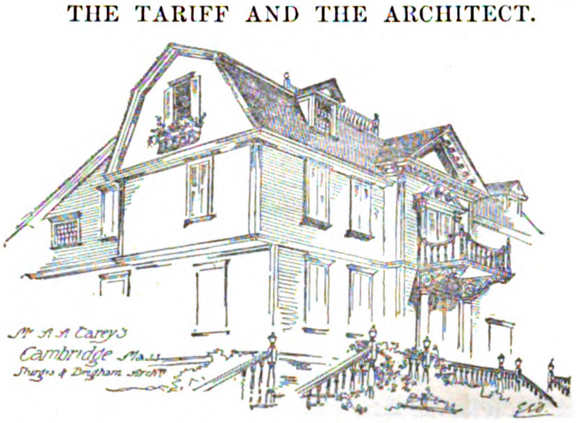
ANNE DE MONTMORENCY.—Born 1493. Died 1567. Served under Francis I in Italy. Made a marshal in 1522. When the army of Charles V entered Provence in 1536, he effected its destruction by mercilessly laying waste the country through which it must pass. Retired to Chantilly in disgrace in 1541. Under Henry II acquired great influence and made a duke. Defeated and taken prisoner in 1557 at St. Quentin by Philip II's General, Philibert Emmanuel of Savoy, and, consequently, assented to the unfortunate peace of Cateau-Cambrésis. Under Charles IX, he with the Duke of Guise and Marshal St. André practically controlled the kingdom, and signalized himself by oppressing the Protestants. In 1567, he lost his life in a drawn battle, near St. Denis, in which he led the Catholics against the Protestants under Condé.

CHANTILLY.—Anne de Montmorency, High Constable of France, (1493–1567) was the real founder of Chantilly. He employed Jean Bullant as the architect, whose design is duly preserved in Ducerceau's famous book, "*Les plus excellents Bâtiments de France.*" In due course of time this magnificent domain came into possession of the Grand Condé, who settled at Chantilly in 1660, and rebuilt the whole structure, except the little château (Le Châtelet), in the style of the time of Louis XIV with gardens laid out by Le Nôtre. The Grand Condé died in 1686 and his grandson built the immense and gorgeous stables near the château. The monumental entrance with a great bas-relief of horses placed above it, is gigantic; the drinking-trough, guarded by splendid sculptured horses, is colossal; the vast stalls will accommodate 240 horses and in the rooms overhead are suites of apartments for fifty guests. The Revolution razed Chantilly and its glories to the ground, these stables, with the châtelet and the château d'Enghien alone being spared, under the plea that they would be useful for cavalry. At the Restoration the castle of Chantilly again came into the hands of the Condés and their descendant, the present Duc d'Aumale, about 1840 conceived the idea of rebuilding it. His project was perforce deferred by the Revolution of 1848 and its attending events and it was not till 1876 that the work was begun. The architect chosen was Daumet and the work was completed in 1883 at a cost of eight millions of francs. In the château have been replaced a number of precious fragments of the old château, saved by Lenoir, and the rooms are filled with paintings of the highest rank and many other priceless objects of art. In 1886, the Duc d'Aumale generously presented the château, with all its collections, to the Institute of France, to be preserved exactly as it stands and opened to the public as the Condé Museum. The value of this gift is estimated at nearly fifty millions of francs.

[To be continued.]

[1] "*Monuments erigés à la gloire de Louis XV,*" *par Patte*, 1765.

THE TARIFF AND THE ARCHITECT.



MANY men, clever and otherwise, presume to criticise, and would amend to suit themselves the long list of duties on imports to this country, but only a few, comparatively, have, by long and tedious work, been able to grapple intelligently with the problems offered them, which, although not so great if considered singly, and, by men whose walk in life leads them by the road along which any article endeavors to thrive; still, when it is remembered that those who introduce "bills" have to first acquaint themselves and become familiar with many more things regarding every article or commodity that has been, is, or will possibly be imported, than most men know about their single line of business, and the effect or non-effect duty or free entry would leave on it, the labor is seen to be no slight one.

To introduce a tariff bill that will please all is literally an impossibility, as there are many men and many minds, but the end is not this: it is to give the greatest benefit to the "country," *i. e.*, to the majority of the people.

How thankful those who are getting up a bill of this sort must be to any one who will help them by giving to them honest facts can be readily imagined;—help them by giving them truths and realities from a simple desire to benefit the people; with no thought of encroaching upon the time and work of those engaged in such an enterprise for the sake of furthering their own selfish, and oft-times dishonest ends.

As it is with the makers of our tariffs, so it is with any whose affairs and business in life embrace more knowledge of the various arts and industries than they can naturally attain to.

The artist studies and practices his art, the engineer his engineering, and each finds a life-work and has all he can well attend to. An architect has to embrace some part of both these in *his* work, besides countless other minor details of construction and knowledge of material used, besides an insight into human nature; for it is not only his desire to please himself and to work to his ideal, but he wishes to please his client—the one who trusts in him not only for the work done, but for the way it is done and for what it is made of.

It is absolutely an impossibility for an architect to-day—the time of progress and advance in all mechanics and manufactures—to keep himself thoroughly posted in the detail of the manufacture and the quality of the material he builds his houses and his edifices of.

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Help — honest help — to him is as much needed and as thankfully received, as it is to any one who has to deal with a multitude of different classes and kinds of work, any one of which he could almost spend his entire time on.

This is said to be an age of scepticism, but while this may be too severe a word, we certainly live in a time when we are apt to criticise things we see or hear, and we do not readily accept what we are told for fear of being deceived. No man cares to be deceived. He loses confidence in himself as well as in others — his *amour propre* is injured along with his faith.

It has recently become the custom for those having anything worthy of attention to be used in the construction of houses and other buildings, to put the matter fairly and squarely before the only one to whom they can go — the architect. In some (fortunately few) cases he has been known to object to this, not on account of any imagined interference with him, but because he deems a fraction of his time too valuable to be given for instruction in something or other by those he imagines have private ends to gain, and in whom he lacks confidence. Whether this lack of confidence is justified or not is a matter for individual consideration, but the representations of an upright and an honorable business house can readily be distinguished from the misrepresentations of unscrupulous parties who offer inferior articles with a so-called "guaranty" relative to their being "equal to" other goods well-known to all interested in good material and work.

If the architects do not stand by those who have helped them and endeavored to introduce, or have introduced, better classes of material of different kinds, used in or on our homes, they allow the results of honest work to be enjoyed (for a time) by the crowd who always follow in the wake of success, and defeat the very purpose and object had in view by those who were ready and willing — nay, anxious — to have the superiority of their material or wares tested and proved.

If architects do not encourage the *best* materials, and insist upon their being used, they will not find a place in their work, and while it is, nevertheless, a fact that the best goods will still continue to survive and be used by those who appreciate them, those who do not may in the end find it react to their own disadvantage.

Importer.

COMMUNICATIONS

ARCHITECTS AND LIBRARIANS; AN EIRENICON.

Amherst, October, 1888.

To the Editors of the American Architect:—

Dear Sirs, — With the great increase of public libraries and the growth in public taste, the architecture of libraries becomes daily of more importance. It is much to be regretted that there should seem to be a sort of irrepressible conflict between librarians and architects, as indicated in your recent editorial, occasioned by the librarians' conference. As a librarian of perhaps a little more than ordinary experience with, and observation of library buildings of different styles, I feel inclined to attempt to explain this appearance of conflict and say a word for peace and co-öperation.

In the first place, I would like to say that in my intercourse with architects I have always found them ready and eager to get the views of a librarian and quick to put them in practice as occasion served. Of course it is easy to say that architects, like other artists, are impractical and ready to sacrifice everything else to the æsthetic demands of their art. But the architect is so constantly, from the first step in this career, put to the solution of the most practical problems, and required to deal so largely with questions of convenience and economy that such a charge can hardly hold good. Certainly there is no reason why this unpracticalness, if it existed, should not interfere as much with success in the erection of a railroad station or a school-house as in that of a library. Nor would I admit that the failure of architects and librarians to agree is due to an uncommon development of "crankiness" in the members of our profession. Some of us are perhaps a trifle long-haired, with all that the word implies, but, mark you, it is not from this wing of our company that the sharpest criticism of the architect comes.

Where then shall we look for the reasons for this controversy? I will undertake to give a few and draw their moral. Not the least important is the one mentioned in your editorial, — the disagreement among librarians themselves as to what is wanted in a library building. But while there is this disagreement and while some of our most heated discussions among ourselves are on this very point, there is now practically a consensus of opinion as to a few leading principles. And any one who cares to follow through the volumes of the *Library Journal* the reports of our annual meetings, cannot fail to perceive certain lines laid down with something approaching constantly nearer to unanimity. Among these indications are the abandonment of lofty interiors with fixed alcoves and galleries, and the substitution of iron stacks or portable wooden cases placed near together in plain rectangular interiors; the demand for abundance of light, preferably from the higher part of the walls, and not from the roof; the use of small tables and light chairs, instead of the large heavy tables and the artistic chairs, conformed to the style of the building but awkward in use, which have so commonly been put in reading-rooms; the provision of ample, convenient and well-lighted work-rooms for the librarian and assistants.

But if there is not much disagreement among librarians about these matters, there is a cause for the trouble which architects have in getting proper direction when they undertake to plan a library that seems to me responsible for more of the trouble than any other. It is this: libraries are generally built under the direction of a building-committee, consisting of some members of a Board of Trustees, often dominated largely by the views of the donor of the building. It is very unusual to find a librarian of any experience either on such a building-committee, or, in any proper sense, consulted by it. A large share of all the new libraries are erected for incipient libraries, or for those which are not of sufficient importance to demand the services of an experienced librarian. These building-committees are more apt to accept plans which present a tasteful and showy appearance and also conform to the style of some existing, and perhaps famous, library, than to make sufficient study of the matter to learn that a new era has fairly dawned in library building and to go by the best light of that new era. And in this state of things who can wonder if but few architects become fully aware of the new demands in this department of their profession?

I cannot forbear in this connection to refer to the honored name of Richardson, which is used quite freely in your editorial. I presume no librarian can be found who will fail to do justice to the excellence of the work of our greatest architect. But on the other hand, whatever disagreement there may be among us, I am equally satisfied that no librarian, who could be quoted as authority in the profession, would express approval of the main features of Mr. Richardson's library buildings in so far as the interior is concerned or affected, — simply because Mr. Richardson's work in this line was very largely done under such circumstances as I have described. I have the best reason for believing that had he lived but a few years longer, he would have come to build libraries no less beautiful and appropriate in general effect than those he left, but better fitted to meet the wants of the modern public library. For while there may be more or less conflict between "art and use," in this department as elsewhere, I do not believe that any man of genius, alive to the real needs of such an institution, will fail in the attempt to meet those necessities, while still responding to the æsthetic requirements peculiar to this class of work. Fortunately examples of success with this problem are multiplying, and many librarians are ready to point to their architects as friends, not "natural enemies."

Wm. I. Fletcher, *Librarian of Amherst College.*

[Mr. Fletcher has accepted our invitation to develop with a little more detail the criticisms and suggestions which, it appears, are hidden from the architects in the pages of a journal which they are very unlikely ever to have consulted. — Eds. American Architect.]

SOME ANSWERS TO MR. ATKINSON.

New York, October, 1888.

To the Editors of the American Architect:—

Dear Sirs, — The inquiries of Mr. Atkinson in your issue of Oct. 13th, are very pertinent now when time is considered so much a matter of money, especially in our large cities.

Every serious fire means a loss in rentals of from six months to a year, and in a large six-story warehouse this is no trifling matter.

This, however, is not the worst of it; many good tenants may secure suitable accommodations elsewhere and decline to return to the restored, or possibly, new building. No doubt the cost is what deters many owners from putting up what are generally classed as strictly fireproof buildings, and yet much may be done to lessen the risk in buildings largely composed of wood.

Possibly the difficulty students experience in getting the information they desire arises from the fact that the architects, in whose offices they may be employed as draughtsmen, are not fully posted as to the progress which has been made and what can be obtained from manufacturers who are in the fireproofing business. With a view therefore, of supplying some information on this point, a brief description of what is in general use in New York may not be out of place.

Partition-blocks of hard-burned clay are generally used in places where there seems to be most danger from fire, as for example, light, vent, and dumb-waiter shafts. These blocks are made from three up to six inches in thickness and twelve by six inches, thus requiring two to a square foot of surface, and either set on T or angle irons, or else built up like ordinary bricks with mortar or cement.

Mansard roofs, gables and towers are filled-in with roof-blocks varying in size and thickness according to the spaces they are required to fill, seldom over six inches in thickness nor longer than two feet; it is best that they should not be more than twenty inches in length.

Ceilings are protected by blocks from one-and-one-half inches up to two inches in thickness and from one to two feet square, fastened to the beam by a nail and a washer or by a staple which projects under the block far enough to make it secure when it has once been put in place.

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Girders and other large beams may be covered by these blocks secured in place in a somewhat similar manner. When transportation makes it too expensive to use hard-burned clay, plaster blocks may be used, and, if large amounts are required, they may be made on the spot to advantage.

The great danger in most buildings is that they are so constructed that a slight fire in the beginning frequently starts in a vital part, and before it is discovered, has gained too much headway to be checked. For example, open hatchways or enclosed wooden hoistways form chimneys when they catch fire and, igniting the several floors as the flames ascend, it is a matter of but a few minutes before the building is in a blaze from cellar to roof. If, on the contrary, the ceilings and beams are protected from the flames, the smoke frequently would make its way to the roof and give warning of danger before much actual damage had been done. In the "Dakota," a fireproof hotel and apartment-house, it is said that one of the light-shafts was used as a sort of chimney and that a large amount of rubbish was brought to the shaft, before the building was entirely finished, and burned up, to save the trouble of carting it away, without the slightest risk to the building. SALAMANDER.

ITHACA, N. Y., Oct. 16, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs, — I have given no little consideration, on behalf of the students in this department whom we are trying to adequately equip for the practical duties of their profession, to the question raised in your current issue by Mr. Atkinson. I must confess that I have met with no little difficulty, which was not wholly dissipated by a reply of Mr. Woodbury, to my question whether he thought the method of slow-burning construction was applicable to the problem presented in the design of dwelling-houses, that he could not yet see how it was to be effected. That much can be done in the construction of dwelling-houses to better adapt them to resist fire than those built after our present most prevalent method, I grant; and I know that most, if not all, well-informed architects are gladly availing themselves of the new light thrown upon this object by the work of Mr. Atkinson's company. But at the present stage of the problem two difficulties present themselves. If we prepare a design for a dwelling-house which would be accepted as a good risk by any or all of the Factory Mutual Insurance Companies, we could not induce our clients to live in a structure which is so radically different in external and internal effect from the sort of house they have been accustomed to; or else, if we attempt to apply those principles of slow-burning construction to current phases of design, the cost is so great as to be prohibitive. At the present stage of the progress of the problem, it is quite evident then, that Mr. Atkinson's admission "that the greater part of the difficulty lies with the owners and not with the architects" is well founded. C. FRANCIS OSBORNE.

THE PRESSURE OF FOOTINGS ON THE SUBSOIL.

CHICAGO, Oct. 16, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs, — In No. 667 of your valuable paper you comment on a communication to "*La Semaine des Constructeurs*" wherein attention is called to the fact that small foundation piers will sustain more weight per unit of surface than larger ones. I beg to say that this principle of computing the area of footings is well known to Chicago architects and builders and that to my knowledge nearly all our important foundations have been calculated accordingly. The result may not be directly due to friction only, but also to the fact that in consequence of friction the solid compressed by the bottom-layer of the foundation is not a prism but a truncated pyramid, the sides diverging towards the bottom.

Very truly yours, F. WAGNER.

A SAD CASE OF AN AWAKENED CONSCIENCE.

YORK, PENN., Oct. 15, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs, — A case has come to my notice, a reference to which in your journal, I think, would be interesting and beneficial to your readers, as illustrating some peculiarities of the profession in general, and of its clients in particular. During last July a Mr. C., a gentlemen of wealth and education, residing in X——, Pa., called at my office with the intention of securing drawings for the front of a store and office building, and which I was led to believe was to be suited to an old building. I exhibited to him a number of fronts which are already built, that he might more readily compare the relative cost and appearance of the designs, and I also showed him some of the buildings as they stand. Although he was very undecided and indeed incapable of deciding what amount he should spend on the front, he left me with instructions to submit a sketch of a front that in my opinion would best suit his requirements. However, while the design was in progress, I learned that he had previously engaged Messrs. Y——& Z——, architects of X—— to design the entire building, who were then engaged upon the work, ignorant of the fact that he was seeking other designs. Feeling that it would be a most unprofessional undertaking to continue the work, I informed my proposed client that under the circumstances I must decline his commission, urging him to be guided by the professional ability of the architects whom he had first employed.

I heard nothing further of the matter until Messrs. Y——& Z—— informed me that they had instituted legal proceedings against Mr. C., to recover their regular commission on drawings provided by them.

Further information disclosed the facts, that after my declining to execute his work, their client had proceeded to Philadelphia, and succeeded in obtaining a design for the front from a prominent architect in that city, which he adapted to his use, in conjunction with the plans and other details of Messrs. Y——& Z——, who had not only designed a front with the expectation of its being fully carried out, but had made five or more separate designs for the building as per Mr. C's instructions that the building should not cost more than $16,000. Mr. C., however, being of a very nervous and undecided disposition, in his desire to add here and there something unique or ornamental, made frequent and material additions, which increased the cost of the building to $19,000, according to the estimate of the lowest bidder. Without according to the architects the privilege of reducing this estimate, Mr. C, refused to pay the architects their commission, on the ground that the building had exceeded the cost stipulated.

The architects claim, however, that subsequently Mr. C. erected the building after their drawings, with the exception of substituting this Philadelphia front. Seeing that they had good cause for action, and wishing to make a test case out of it, they commenced a suit to recover their commission, and the progress of the matter seemed in their favor.

I write with a lengthy newspaper account before me for reference, and the most singular circumstance of the case follows. Mr. C. had a presentiment that the suit would be decided against him, and on the day named for trial he asked for a postponement for one day, which was granted. In the meantime the architects secured some valuable witnesses, which fact, being reported to Mr. C., seemed to cause him intense uneasiness. On the following morning, the day appointed for the postponed trial, he was found dying in his bed, having taken a fatal dose of morphia, as the coroner's jury decided, with suicidal intent. The deceased had no other business troubles, and this unfortunate matter was to him only a trifle, some $1,200.

The above are the facts of the case which you can use at your discretion. Yours truly, J. A. DEMPWOLF.

[WE give Mr. Dempwolf's letter in full, as his curious story hardly ought to be abridged. The client whom he so honorably gave up for the sake of professional courtesy seems to have been hardly in his right mind from the first. — EDS. AMERICAN ARCHITECT.]

MISAPPROPRIATING ANOTHER'S DESIGN.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs, — Will you kindly answer the following through your valuable paper:

We designed a house at X——, furnishing the contractor with full-size details for every part of the structure, including mantels. The contractor (one of the kind who "furnish plans and estimates cheerfully") has, in a house built and designed by him at X X——, duplicated a mantel from full-size drawings furnished him by us for house at X——. Is he liable for thus using our drawings, and can we obtain legal redress?

We remain very truly, HAMILTON & MERSEREAU.

[WE doubt whether legal redress can be obtained for this mean trick. If the authors of the design wished to retain their property in the design itself, they should have copyrighted it; otherwise it is permitted to any one to imitate their mantel at pleasure. If it could be proved that the contractor used for his own profit the full-size drawings which had been entrusted to him for another purpose, we think that he could be made to pay damages for the unauthorized use of property not belonging to him; but he would probably swear that he had not used the drawings, but had only duplicated the mantel which he had just made. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS.

A LEANING STEEPLE AT COVENTRY. — The following particulars concerning the steeple of St. Michael's Church have been published in the *Coventry Herald* by Mr. Andrews, one of the city councillors: —

In the year 1818 the upper 24 feet of the spire was taken down and rebuilt. The builders at that time must have known that the steeple was out of perpendicular, for they rebuilt the 24 feet exactly upright, so that previous to the present restoration there was a bend in the spire where the portion which had been rebuilt joined the old work. Yet it would appear that all knowledge of this had perished, for the discovery by the contractor at the commencement of the present restoration that the tower was not upright came upon us as a surprise. It will be recollected that when the discovery was made, I at once suggested that the steeple should be plumbed from the summit, so as to ascertain the total deviation from the perpendicular. A wire was suspended without delay, and an account of my observations was published in the local press about three years ago. Now that the work is approaching completion, and the steeple settled upon its new foundations, it seemed to me that

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fresh measures of the leaning should be made before the scaffolding was removed, in order to hand down to our successors an exact knowledge of the extent to which the steeple leans from the perpendicular. We, therefore, suspended a fine copper wire from the centre of the spire at the apex of the hollow, 267 feet above the floor of the church. A sixteen-pound iron weight was hung at the bottom of the wire, and suspended in a bucket of water in order to prevent it swaying with the wind. Measures were made by myself and the clerk-of-the-works (Mr. Webster), with every precaution to avoid error, on two calm days in July. On one of these days the weathercocks indicated an E. S. E., wind (or *with* the leaning of the steeple), and on the other day a N. W. wind (or *against* the leaning of the steeple). A mean of the measures gives the following results:

	Out of perpendicular.
Centre of lead floor at octagon . . .	23 inches.
Centre of steeple at 267 feet	38½ "
Base of weathercock at 290 feet . . .	41½ "

In order to test these results I had the wire suspended from the centre of the lead floor in the octagon (132 feet from ground) to measure the leaning of the tower only, and sets of measures were taken upon several calm days both in July and also in the present month, and these were finally verified by the city surveyor (Mr. Purnell). No sensible difference was found between these measures and those made when the full length of wire was used. St. Michael's steeple, therefore, is 3 feet 5½ inches out of perpendicular. It is proposed to place two marks upon the pavement inside the tower, one of which will be in the centre of the tower, and the other exactly under the weathercock. They will of course be 3 feet 5½ inches apart. It does not, however, require any measuring to see that the steeple is not upright. The leaning is visible to the naked eye. From the far end of Grey Friars' Green, where the steeples of Christ Church and St. Michael's are nearly in a line, it is easily seen that St. Michael's leans to the left, whilst from Ford Street, near the City Mill, it is seen to lean to the right. The direction in which the steeple leans is 37 degrees N. of West, or towards the Free Library. The lean of St. Michael's steeple as given by the *Herald* above is nearly identical with that of the Belfry in Bruges—a deflection from the perpendicular which is very perceptible from the northern points of the city.

The Cemeteries at Constantinople.—At Constantinople the big Mussulman cemeteries are sights that every visitor goes to see. From the comprehensive outlook of the Saraka or Galata Tower, a panoramic view of the city embraces forests of dark cypress here and there. The black masses of woodland stretch along the Golden Horn, and encompass the city on every hand. They are the famous cypress graveyards of the Ottoman capital, and well worth visiting, as nothing like them is to be seen elsewhere. These cemeteries may best be described as dense forests of cypress trees and tombstones—tangled masses of graves and trees. The cypresses have grown to enormous proportions, and the dense, dark foliage forms a ceiling through which the sunshine penetrates only in streaks. The cathedral aisles of the trunks, and the tablets of the dead, are bathed in twilight all day; on moonlight nights the dark cypress cemeteries are weird pictures indeed. The Constantinople headstone is a rude representation of the human form, with a fez or turban chiselled on the top, so that on these moonlight nights they may well be taken for crowds of ghosts. In these Constantinople cemeteries, too, one may read a rare essay on natural economics. Whence comes the remarkable vigor and thrifty appearance of those thousands and hundreds of thousands of huge cypresses? The other hills and vacant areas around about them are barren, and trees planted thereon and left to take care of themselves would hardly survive. Whence, then, come the giant growth and the dark, almost black, glossy foliage of the cemetery forests? The Turkish custom of crowning their gravestones with a representation of the head-dress worn by the departed during life, furnishes a ready index to the age of the grave, apart from the epitaph. Side by side one sees in the Constantinople cemeteries the huge turban of the time of Mahmud II, and the modern fez, the former still a mass of gilt, the latter painted red. But the most impressive feature of the cypress cemeteries, and that which appeals particularly to the imagination of the Western visitor, is the way the headstones are crowded together. In spots they are literally placed as thick as they can stand, a mass of upright slabs through which one could hardly force a path. In other places they are toppled over, and lie like fallen sticks of timber one over another. The dead of different periods must have been buried one on top of another, and new bodies wedged in wherever enough soil was found to cover them up. Well might the proud old cypresses lift their glossy heads skyward and increase their swelling girth.—*Thomas Stevens in N. Y. Evening Post.*

Needless Noises.—One of the injurious influences of a city life is the nervous derangement often caused by the incessant noises that a lax or cowardly municipal government tolerates, through ignorance of the effect or fear of offence to certain voters. It is a mischief operating so subtly and imperceptibly that it is not commonly suspected till its worst effects have become almost immovably fixed. It is doubtful if any nervous system ever becomes so used to this incessant strain upon it as to feel no harm, though it is a rare case that the victim of some undefined disorder, nothing serious, nothing certainly traceable to any specific cause, nothing to require medical treatment, and yet withall a condition different from that of a hearty country life, recognizes it as the effect of the never-ending, constantly changing uproar of a city. The yelling of steam-whistles, the hiss of steam-pipes, the rattle and clash of wheels on stone-covered streets, the rumble of street-cars, the clangor of bells, the howling of hucksters, keep up a condition in which a healthy nervous system of natural strength and sensitiveness is impossible. And there is not one of these agencies that is not suppressed more or less completely in most of the great cities of the world. In Berlin heavy wagons are not allowed on certain streets. In Paris any cart-load of rattling material must be fastened till it can't rattle. Munich allows no bells on street-cars. In Philadelphia, church-bells have been held a nuisance in certain neighborhoods by judicial ruling. Steam-whistles are forbidden in nearly all the larger cities of this country and Europe. Milkmen and bakers are not allowed to use bells or horns in some cities. In others the abominable yelling and howling of hucksters for which there is no excuse at all, are prohibited. Our city might make a trial of one or two cases as an experiment.—*Indianapolis News.*

Eighteenth-Century Pews.—The cosy squire's pew of the eighteenth century was an elaborate structure, luxuriously furnished, and surmounted by crimson curtains. It often contained the only fireplace in the church, and was not complete without a square table. During the reign of George I a colored footman would enter with a tray of light refreshment just before the sermon. In one of these retreats, Ernest, duke of Cumberland, being ensconced, was roused from a doze by the exhortation—"Let us pray." "By all means," shouted the duke, "I have no objections." The poor were accommodated in narrow pews, very high and stiff in the back. No wonder a timid child remarked that a man in velvet breeches had sat her on a pantry shelf and shut the door.—*The Argosy.*

TRADE SURVEYS

A number of influences that have been at work for a year or more past far beneath the surface of trade are now beginning to crop out. Speculators and investors are very solicitous that these unfavorable symptoms should be hidden from the public view, and that the cause producing them should be corrected as soon as possible. A good deal of the prosperity apparent upon the surface of trade is sustained by artificial aids, such as governmental bond-purchasing, by which money is kept in sufficient supply. If the Government was not a buyer, and was unable to be a buyer of its own obligations, a financial astringency and a commercial depression would swoop down upon the country like a Dakota cyclone. This is not a comfortable piece of information. The Secretary of the Treasury has disbursed $15,000,000 since April, and since September 1st has had to add $45,000,000 to keep money easy. Such doctoring or assistance, or whatever it may be called, should not be such an essential factor in the commercial situation as it is. The financial question, without going into a discussion about it, is becoming a more and more important one, and bankers, manufacturers, railroad managers, and business men generally are beginning to feel the importance of as soon as possible reaching a solution of it which will give us a perfect monetary system. The situation of several of our leading railroad systems is not at all encouraging. Liquidations are necessary in two or three prominent instances, and reorganizations will be forced upon others. It does not follow that the general business interests of the country will suffer from this reorganization; in fact, they will benefit by it. The country is entering upon a new set of conditions and surroundings, and lower prices are taking the place of higher prices. The gross earnings of the railways of the country are increasing, but the net earnings point to a decrease. Dividends are falling off. A fair estimate made by good authority shows a falling off from 1887 in the ratio of 90 to 54. This is bad for the stockholders and for extensive railroad-building operations in the one way, and good for the general public, and will bring no disadvantages to them in the long run. One of the results will be a more honest administration of railway affairs. Stock-jobbing operations have demoralized railroad management, and is driving out honest outside operators out of the market. Railroad buyers are disposed to draw a very unfavorable picture of the future of railroad management and railroad interests, but a correct view of the situation justifies the opinion that the experience through which railroad properties are passing will lead to a far more honorable, businesslike, and able management than has prevailed for the past ten years. Outside of railroad matters, the general business interests are jeopardized.

The political agitations are producing less harmful results than usual. A great deal is said about the smaller volume of business done in consequence of it, but when we come to investigate, the contrary is the case. If there is a lack of investments and a slackening in the run of orders in any branch of business, it is found that the causes are other than political. The business interests of the country, no matter of which political predilection, are not disposed to have their carefully-laid plans overturned to suit politicians, in other words, the business men of the country are disposed to divorce the business matters from politics. It may seem like an extravagant and unwarranted assertion to state that there is more of a demand for locomotive capacity, coastwise tonnage and lake tonnage at this time than there has been for five years, but the statement is true. There are but very few railroad companies in the United States but that are either increasing their rolling stock or are preparing to do so. Every ship-yard along the coast has its ship-making capacity oversold, except an exception be made in the case where sailing craft is turned out. Some few yards have work enough in sight to keep them busy for two years. Three new ship-yards are projected. Southern railroads will place orders this fall for vessels to carry products from the South to Northern Atlantic ports. The completion of the Panama Canal in 1890, if that scheme is successfully executed, will bring a very strong influence to bear upon the maritime interests and indirectly on the lumber, iron and other interests tributary to ship-building. The jobbing interests of the New England and Middle States report a strong spring trade in sight. Samples distributed during the past month have brought more orders in than usual so far ahead. Merchants are endeavoring to correct the evil of long credits and excessive discounts, but are making slow progress in that direction. The boot and shoe manufacturers are ahead of last year's volume of business. Furniture manufacturers East and West have sold more goods than last year. Clothing manufacturers continue well sold up, but buyers of cotton and wool are hesitating before precipitating negotiations for large future requirements. A good deal of hesitancy and anxiety will be eradicated early in November. Business men are anxious to make purchases. Manufacturers are anxious to book orders, banks are willing to loan money liberally. No weak spots exist upon the surface of trade so far as the great bulk of business interests are concerned, it is only when we go to look into the sub-basement of trade that we find weakening foundations. With wise management the foundations of our prosperity can be protected; but a better class of law-makers must come to the fore. The business interests of the country have been too long jeopardized by mere politicians.

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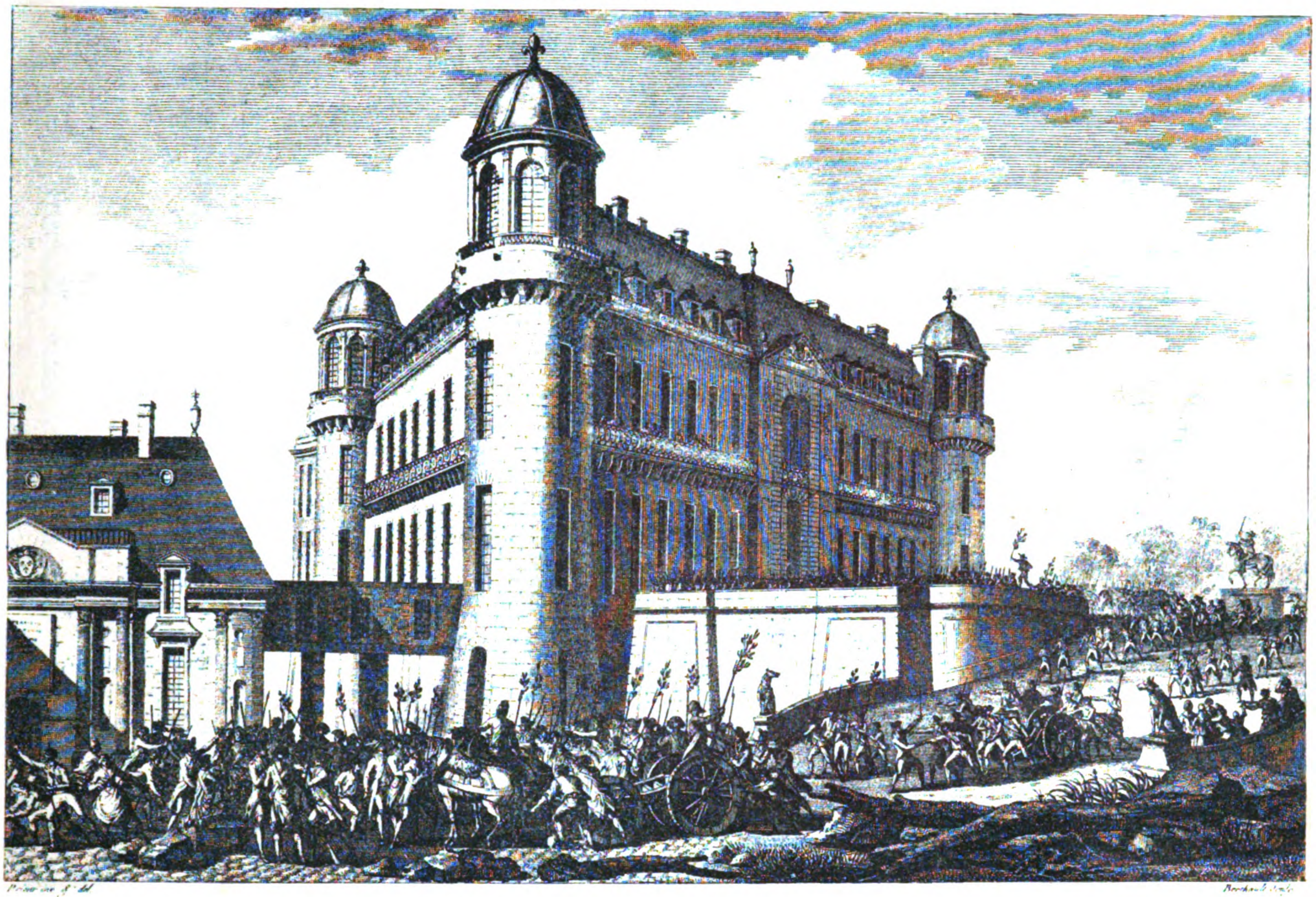

CANONS AMENÉS DE CHANTILLY A PARIS.

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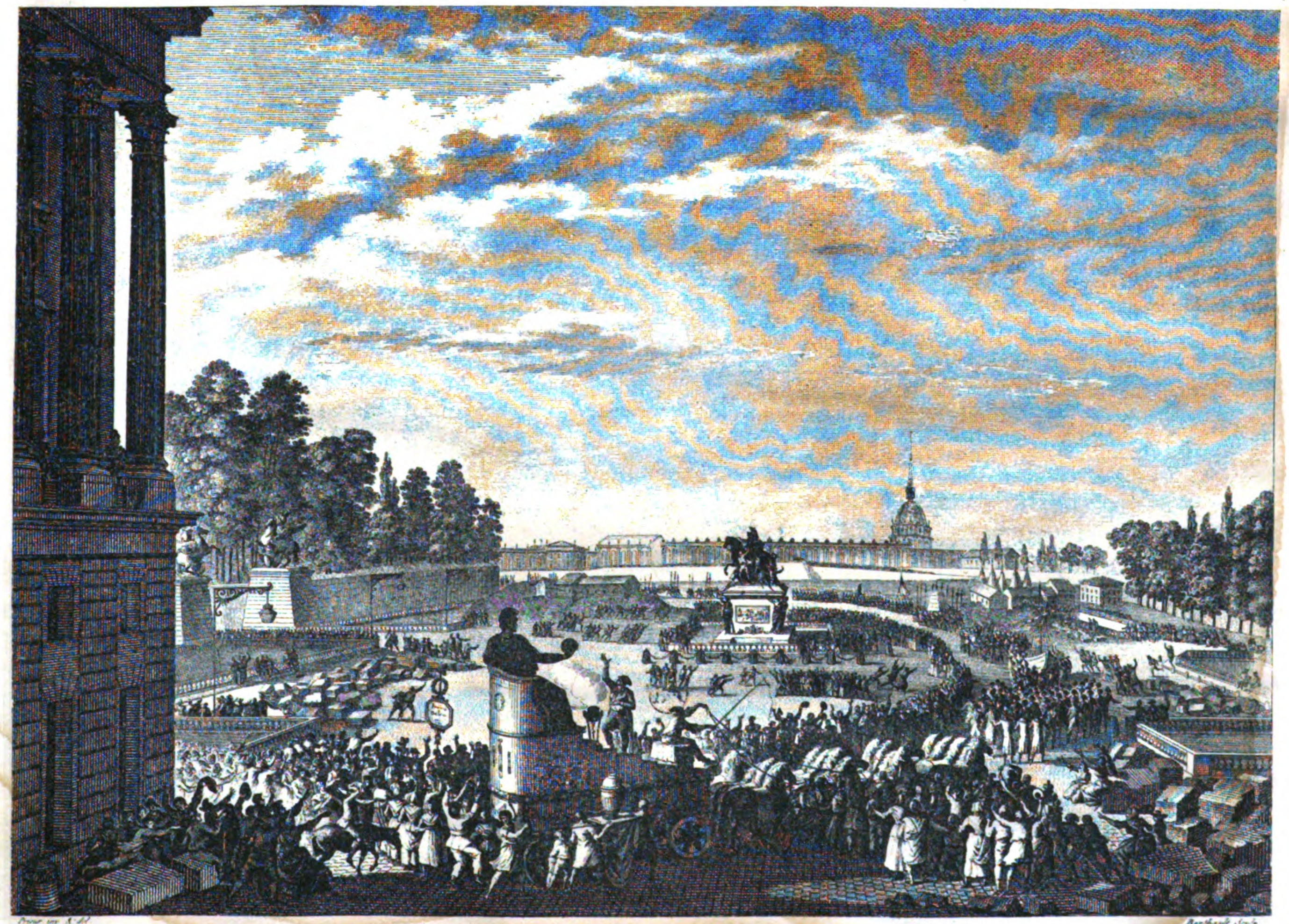

PREMIERE FÊTE DE LA LIBERTÉ A L'OCCASION DES SUISSES DE CHÂTEAU-VIEUX

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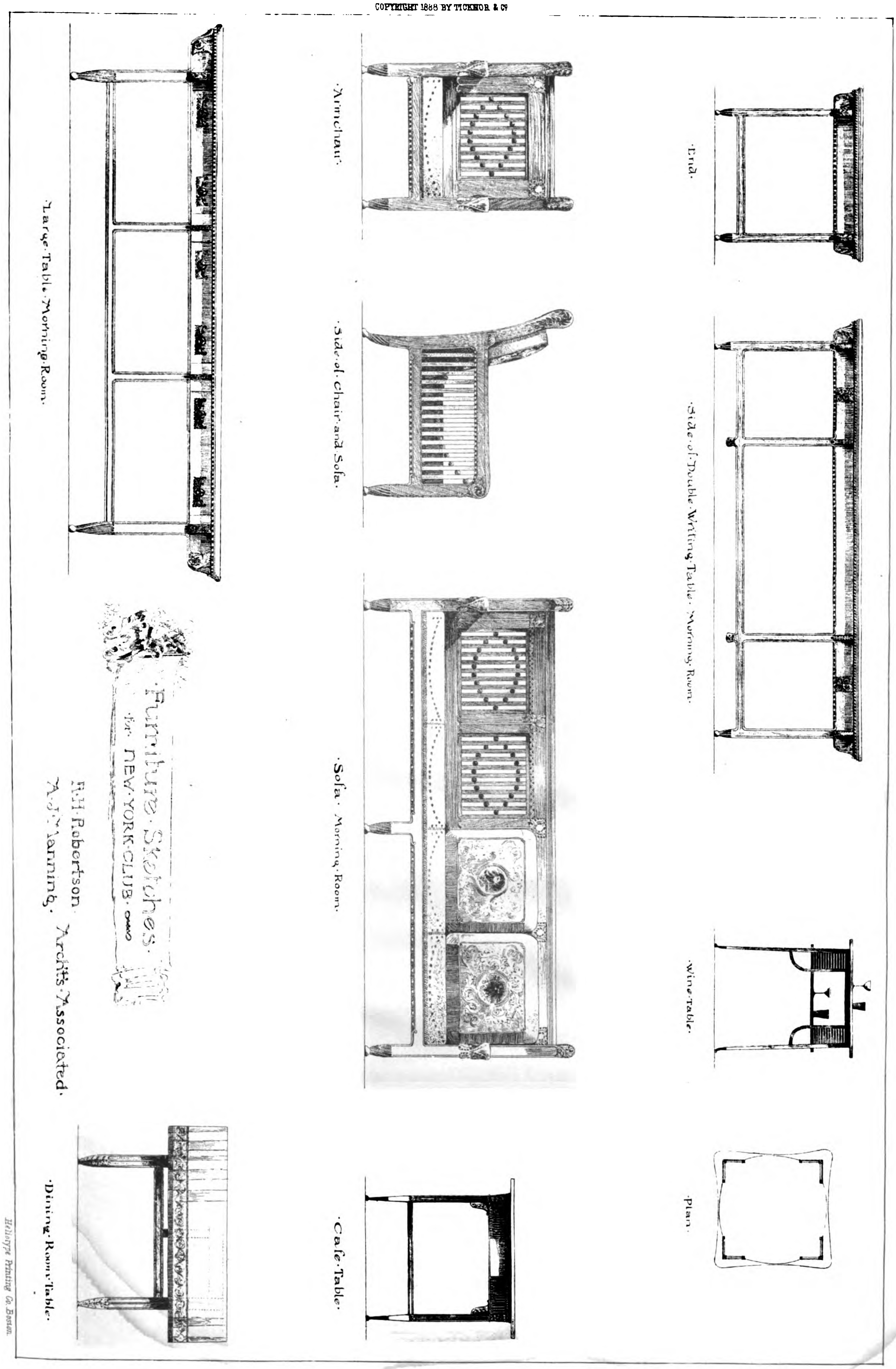

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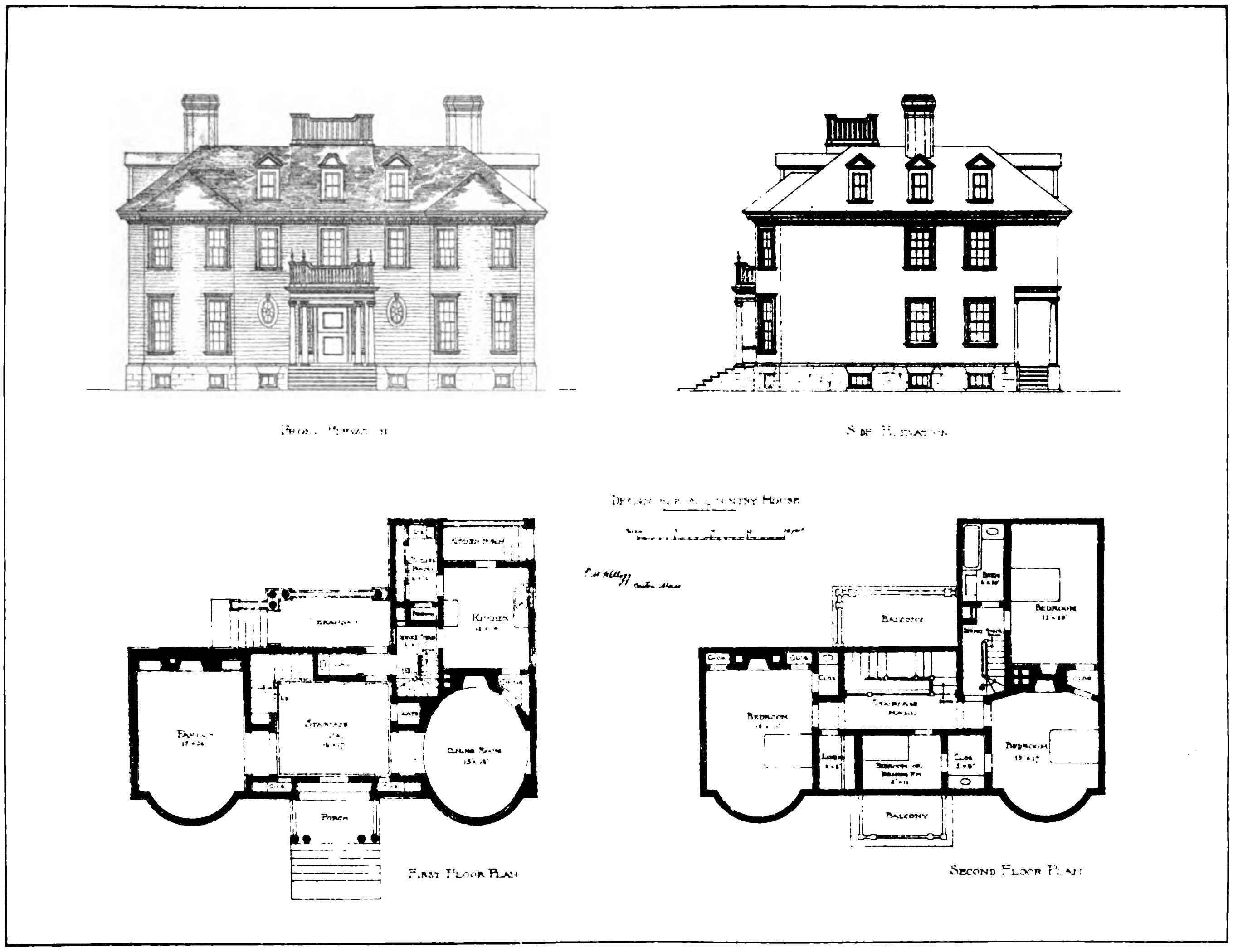

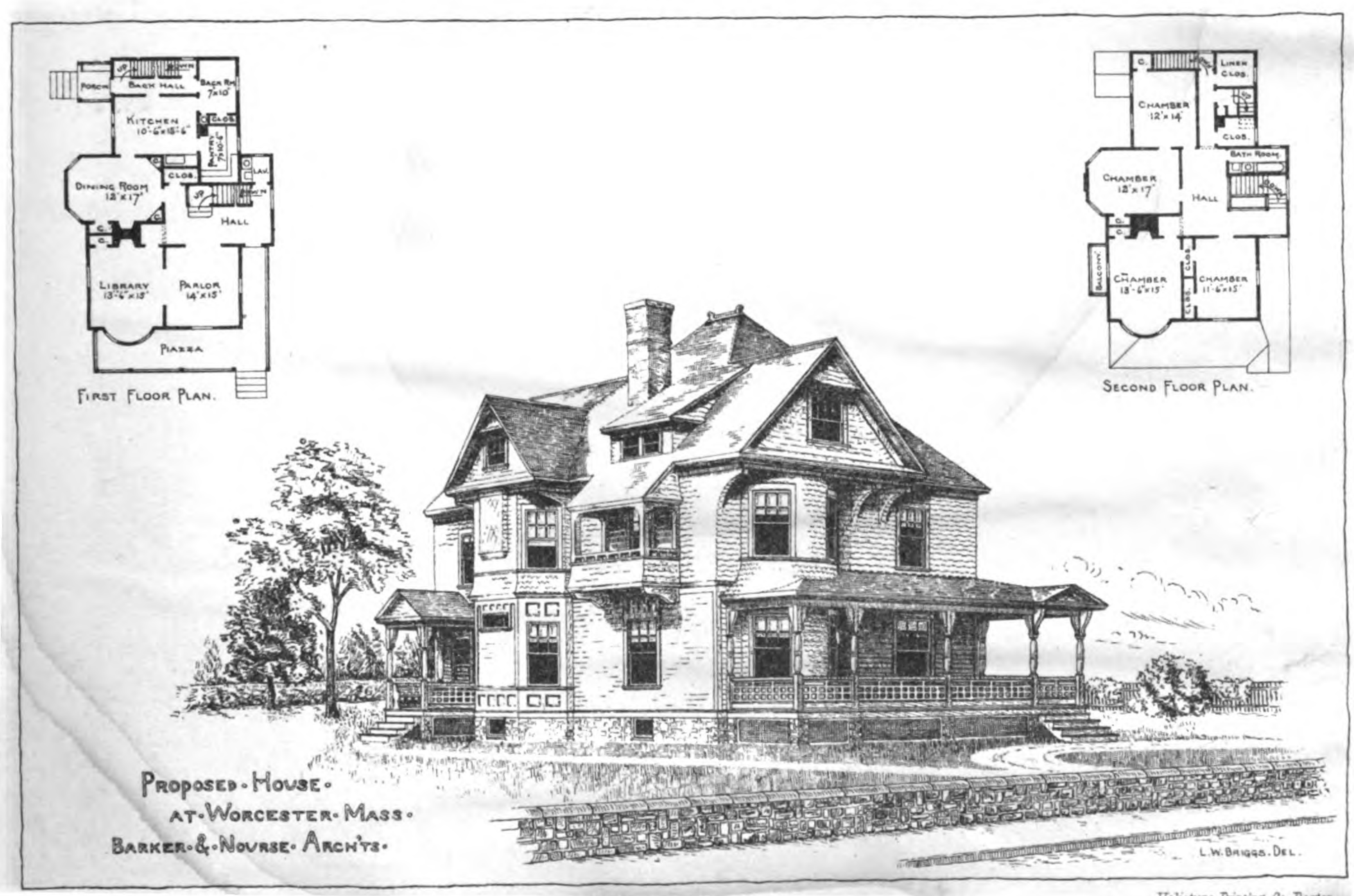

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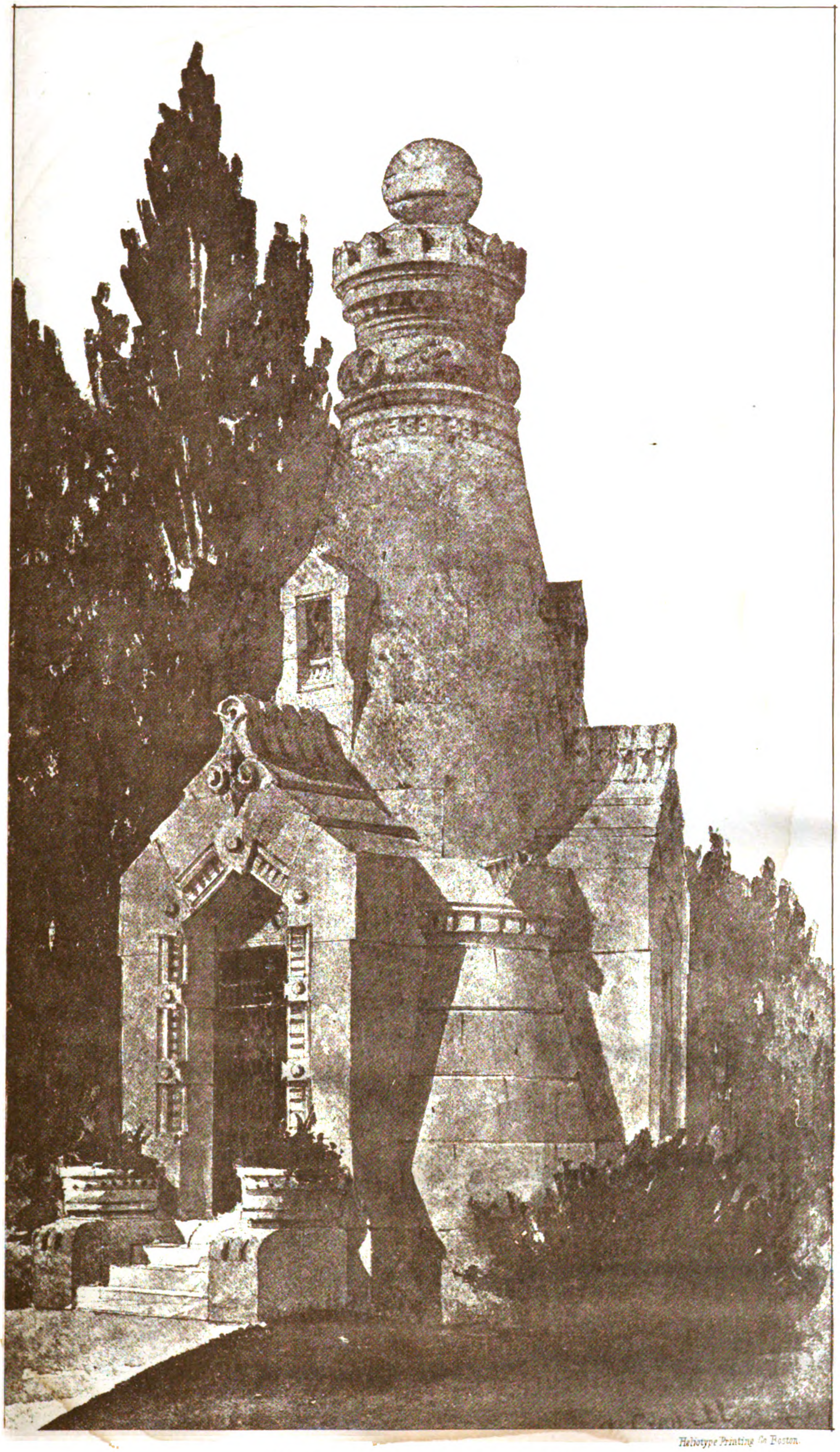

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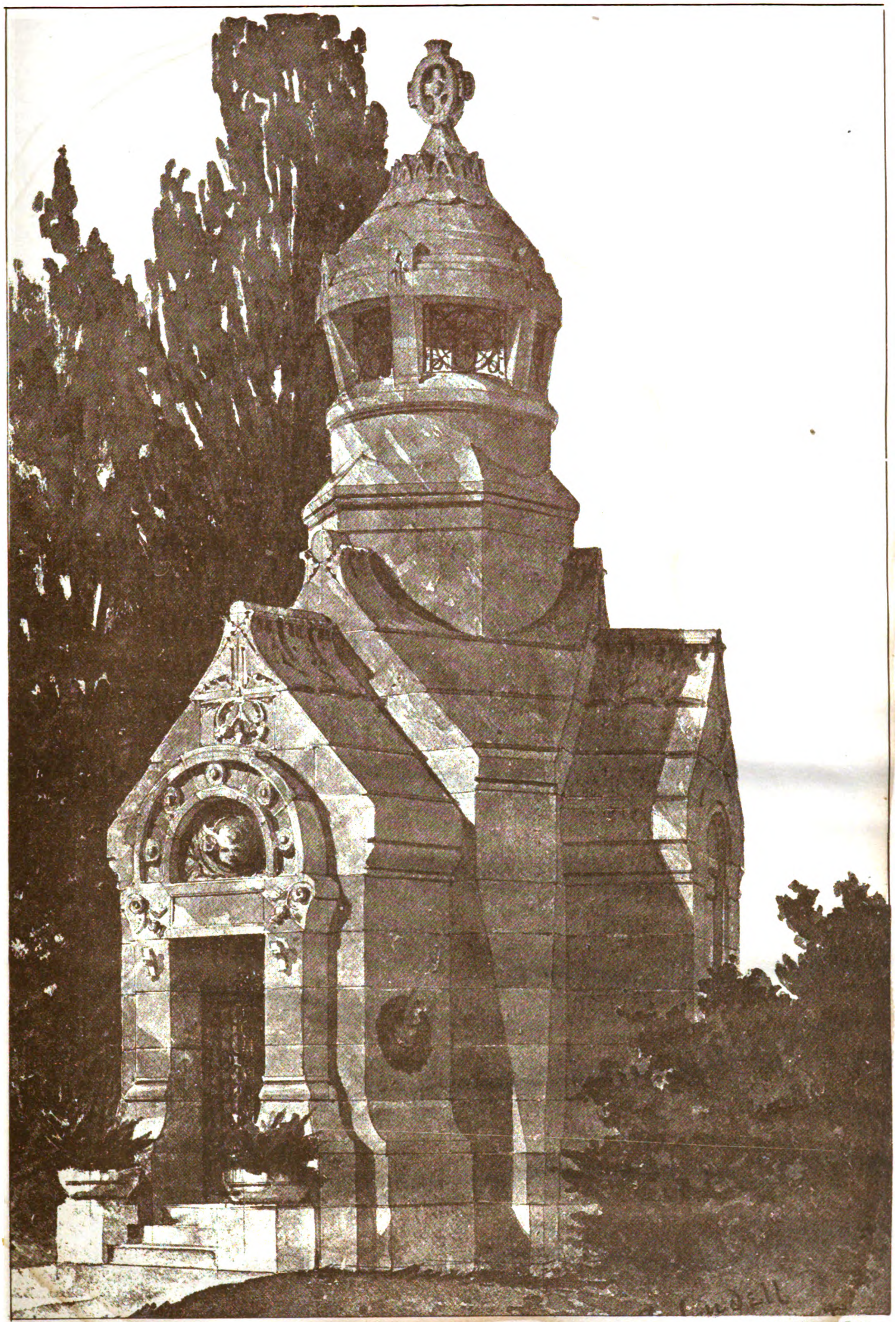

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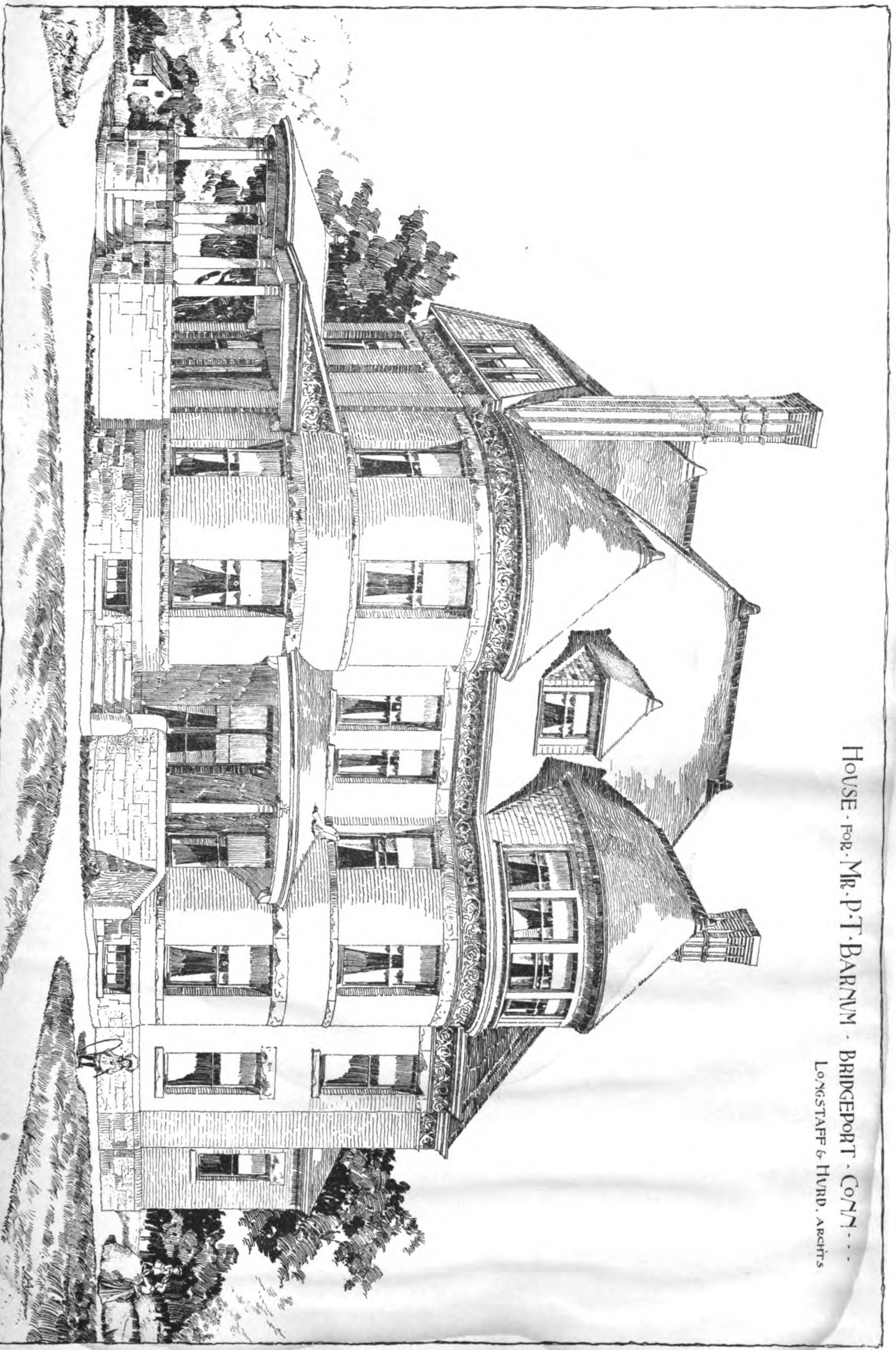

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THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIV. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 671.

NOVEMBER 3, 1888.

Entered at the Post-Office at Boston as second-class matter.

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THE Twenty-second Annual Convention of the American Institute of Architects, which was held in Buffalo on the seventeenth of October, although well attended, seems to have been rather barren of results. About fifty members were present, representing all parts of the country. The principal business was the consideration of the reports of committees appointed by the last Convention, on the consolidation of the professional societies; on uniform building contracts, on forms for Chapter reports; on the provision of a permanent home for the Institute, and on the indemnification of Mr. Bloor. Of these reports, that on the consolidation of societies was decidedly the most important, and a long discussion took place upon it, which seemed to show that nearly everybody wished for such a consolidation, but that no one knew just how to bring it about. One gentleman thought the union very desirable, but believed that the members of one society ought to join the other as individuals, not as a body, to which another replied that if the requirements for admission to both societies were the same, there was no very obvious reason why the two bodies should not unite directly, without a previous dissolution of either, which would be unpleasant, and rather mortifying, to the members of the one dissolved. The result of the debate was that a resolution was unanimously adopted, "amid applause," to the effect that a union of the societies was desirable, and another year allotted to the task of trying to bring it about. Whether the next year will be more fertile of results than the past one remains to be seen.

A NEW scheme is on foot, suggested by the operations of the syndicate which now monopolizes copper production, having in view a combination of all the gold mines in the world for the purpose of advancing the price of the precious metal. At least, that is the ostensible purpose, but the prospectus of the company which is to be formed to carry out the project, as we find it in the Chronique Financière of *Le Génie Civil*, reads to us a good deal as if the profits of the promoters would be derived from the pockets of the stockholders, rather than the more refractory quartz rock. The fact is that very few gold mines are profitable in any case. It is said, we do not know how truly, that the richest gold mine ever discovered, the Ophir, on the Comstock lode, which is now exhausted, never paid its stockholders in dividends enough to make good what they had invested in it; and there are hundreds of mines which produce a certain amount of gold, at a loss to their owners. A syndicate which would succeed in advancing materially the cost of the metal must control these unprofitable mines, to cut off competition from them, and gold is much too widely scattered a substance to be easily monopolized. In Philadelphia the very mud of the streets contain it, and it is estimated that any industrious real estate owner in that city can wash out about a dollar's worth of gold a day, at present prices, from the clay on which the town is built; while an Artesian well driven in Boston disclosed the fact that this city, also, rests on a stratum of auriferous quartz of considerable richness. If any combination should double the value of gold in a few days, as the Société des Métaux did that of copper, we might expect to see every Philadelphian, to whom an income of two dollars a day was an object worth striving for, digging up his garden to wash out the precious particles; and thousands of scanty auriferous deposits, in all parts of the world, would be worked until competition had brought the price back to its normal level.

IN anticipation of the proposed utilization of a large part of the sewage of Paris, by irrigation on the fields of Achères, a Commission, appointed by the French Senate, recently visited the irrigation fields at Berlin. These are now in working order, and furnish the most extensive example of sewage purification by irrigation in the world. Berlin now contains more than thirteen hundred thousand inhabitants, having trebled in population during the last twenty years. In the outlying districts the cesspool is still used, but the whole of the closely-built portion of the city, containing eleven hundred and fifty thousand inhabitants, is thoroughly sewered, and all waste-matters from this part of the population are carried by water to the pumping stations from which they are distributed on the irrigation fields. The method of distribution is very simple. According to the account in *Le Génie Civil*, each of the twelve sections into which the drainage system is divided is furnished with a huge cylindrical reservoir, into which the crude sewage is pumped. Here it is allowed to settle slightly, and is strained by gratings, passing thence to a well, about ten feet in diameter, from which the comparatively clear liquid is pumped directly into the irrigation pipes. These consist of cast-iron mains, with branches of earthenware, most of which are mere open channels. In order to prevent breaking the pipes by the pressure in case they should become clogged, stand-pipes, open at the top, are attached at intervals. The height of these pipes determines the maximum pressure which can exist in the mains connecting with them, as any greater pressure will be relieved by overflowing. As the street wash is brought in the same sewers as the house drainage, the quantity of liquid to be disposed of is very large, and the ground, which rests on an impervious stratum three or four feet below, is unfavorable to filtration. In the first experiments, one acre of irrigation fields was allotted to four hundred inhabitants, but it was soon evident that this was not enough, the land becoming soaked and muddy, and the effluent being imperfectly purified. More land was bought, and an acre set apart for each three hundred inhabitants, but this was not sufficient, and the irrigated fields now comprise about eight thousand acres, while six thousand more remain to be taken into service as the population of the city increases.

THE liquid is applied to the ground by means of the open channels, which are barred by wooden gates, to change the flow as required. The separate patches formed by the conduits are laid out with ridge and furrow, and all sorts of vegetables are successfully grown, together with flowers, principally roses and violets. Of course, the neighboring city furnishes a market for the products of the fields, which are of excellent quality. In the low lands, which are devoted to grass, seven crops of hay are secured in a year, and great numbers of cattle are maintained. So far, there has been no instance of illness of any kind traceable to the sewage. The air is so fresh, that, besides the Cadet School, which existed in the neighborhood before the sewerage system was laid out, two convalescent hospitals have already been built in the middle of the irrigation fields, and other establishments of the sort are in contemplation. Typhoid fever, which might be expected occasionally, as all the people on and about the irrigated farms drink the effluent water, is unknown; and the underdraining of the fields has diminished the number of cases of intermittent fever, which was once prevalent in certain portions of the territory. Although the system is not self-supporting, the receipts of the farms are nearly a million dollars a year, and it is not unlikely that in private hands they might be made to give a profit, while

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the work of purification is so thoroughly done that at one of the stations the effluent water is collected into a pond, in which trout, perhaps the most sensitive of all fish to impurity of the water in which they live, are successfully raised.

PROFESSOR ROGER SMITH delivered a lecture before the students in Architecture at University College the other day, which, as reported in the English technical journals, is worth reading by all architects. The title of the lecture was "Mistakes in Architecture," but it might just as well have been called "Mistakes in the Conduct of Life," for its substance applies to all professions, as well as that of architecture. In general, Professor Smith condemns carelessness in carrying out professional duties; sharp or doubtful practices, among which he includes the solicitation of employment, and offers to do work at less than the usual rates; want of caution in giving orders, or making and noting contracts, and haste or bad temper in business dealings. Especially does he warn his hearers against writing angry letters, which, as he says, are read in cool blood, and excite lasting resentment where hasty verbal expressions would be readily overlooked. We sometimes think that Talleyrand's rule, "Never write a letter, and never destroy one," is the safest one for a professional man to follow; but as he cannot always avoid expressing himself in black and white, he may with advantage remember a story which Professor Smith tells about Sir Robert Peel, or some other noted statesman: A friend of this hero, whoever he was, had been affronted in some such way as we all are occasionally, and had written a letter in reply to the insult. He had worked hard over the letter, and had concocted a masterpiece of stinging sarcasm, which, after a final polishing, he brought to show to his distinguished patron. The statesman read it through without a word, and then inquired whether any copy had been made of it. On learning that there was no duplicate, he remarked, "Very injudicious letter; much better burn it"; and, to make sure of his advice being followed, he put it in the fire himself, and held it there with the poker until it was consumed.

THE *Engineering and Building Record* publishes an interesting letter in regard to the expansion of ice by heat, which explains a good many phenomena that most people have observed, without being able to account for them. According to the letter, a short railway was once built in the Province of Ontario, which crossed a fresh-water pond, known as Rice Lake, by a bridge two and one-half miles long. The bridge was mostly composed of trestle-work, very strongly built, with uprights driven to a hard bottom, and thoroughly braced. The middle portion, over the deepest part of the lake, was composed of trusses, eighty feet in span, supported by piers, measuring twelve by twenty-four feet, and filled with stones. Early in the first winter after the bridge was built, the lake froze over to a depth of about seven inches. Before snow came to protect the ice, the weather moderated, the sun shone out brightly, the ice expanded, and in a few minutes the bridge was in ruins nearly its whole length, the trestles being pushed over in the direction of the principal expansion. The destruction of the bridge caused the temporary abandonment of the railway, but years afterwards the trestles were repaired and filled in with an embankment of gravel, the top of which is eight feet above the level of the water; yet the expansion of the ice during sunny days is so great that it frequently creeps up the embankment, and, by successive movements, is pushed upon the rails. It is evident that such movements as these of vast sheets of ice, urged by the irresistible force of expansion by heat, are of great importance to those who have to build in places exposed to them, and Mr. Dumble, the author of the letter, made recently some experiments to determine the exact amount of the change of volume under different circumstances. For this purpose he selected a mill-pond near his house, and marked off a certain area of ice, which he kept isolated from the ice about it by a canal eighteen inches wide, kept open by constant attention. Near the ends of the floating block, which was one hundred and three feet long, were set pieces of plank, and on these was laid a long pole, carefully spliced, and resting on rollers. By means of marks on the rod and its supports, any variation in their relative lengths could be immediately observed and measured, and a rough shed was built over the place, to prevent the rays of the sun from falling on the ice, and complicating the effects due to atmospheric temperature. Although there were considerable variations in the weather during the first few days of the experiment, the ice showed no movement until it had attained a thickness of three inches, the explanation of this being undoubtedly, as Mr. Dumble says, that up to this point the ice shared the temperature of the water on which it floated. As it thickened, however, it became very sensitive to heat and cold, reaching its maximum dimensions at a temperature of thirty-two degrees Fahrenheit, and contracting uniformly as the thermometer fell below this as far as four degrees below zero, which was the lowest point reached during the season. So long as the ice, frozen under cover, and perfectly clear and homogeneous, kept its character, the contraction and expansion were at the rate of one-three-hundredth-thousandth of its length per Fahrenheit degree, or about fifteen one-hundredths of an inch in the length of the sheet under observation for a range in temperature from zero to the melting-point of water. During February a thaw took place, and the character of the ice was altered, the surface becoming moist, and the substance probably somewhat spongy. When cold weather returned, the rate of expansion and contraction of the ice was found to have more than doubled, the movement due to a variation of one degree in temperature being now about one-hundredth-and-thirty-one-thousandth of its length, or three-tenths of an inch in the length of the floating mass for a range of thirty-two degrees. This, it must be remembered, was simply the excess of expansion and contraction of the ice over that of the wooden rod, which would also expand and contract, at a rate which Mr. Dumble did not determine, and made no allowance for. Strictly, however, the rate of expansion and contraction of the wooden rod is not far from that of the ice, so that the apparent expansion of the ice, as measured by the rod, was only a fraction of the true movement. According to Brunner, the true coëfficient of expansion of pure ice is three hundred and seventy-five ten-millionths for every degree Centigrade, or about six times as great as Mr. Dumble's uncorrected observations indicated, so that the actual lengthening of his floating cake of ice, if measured by two fixed points, as, for instance, points of rock projecting from the bottom, would have been nearly nine-tenths of an inch, and a sheet of ice a mile long would expand and contract nearly four feet. Moreover, as skaters know, movements of the ice on ponds cause long cracks. These fill with water, which is soon frozen into the mass, increasing its volume, and causing it to creep up the banks, or push with irresistible force against a wall or other structure which may be in its way.

IT is curious to observe how important canal navigation is getting to be abroad, in comparison with its condition here. As every one knows, Manchester, which is only thirty miles from Liverpool, and has unlimited facilities for railway communication with the seaport, has just determined to build, at an enormous expense, a ship-canal to the Mersey, through which ships from New Orleans will be able to convey cotton directly to the factories where it is to be spun and woven. In this country, where it has been seriously proposed to abandon the Erie Canal, on the ground that wheat can be carried more cheaply by railroad trains from Buffalo to New York than by boats on a canal owned and managed by the State, such a scheme as the Manchester Canal, which, besides immense land damages, must be burdened with locks, would seem preposterous; yet the English promoters, after spending more than half a million dollars in surveys and estimates, are convinced that the investment will be profitable, and, judging from the experience of other canals in Great Britain, they are right. The Leeds and Liverpool Canal, which occupies with respect to Leeds much the same position that the new one will in relation to Manchester, pays twenty-one per cent annually in dividends; yet this is a small canal, only four or five feet deep, and thirty feet wide, and is obstructed by a hill, over which boats must climb by means of a chain of locks, ascending to a height of more than eighty-eight feet. It may be that the distances in America are too great for successful internal navigation, and that a highly cultivated farming country, like England or France, gives greater encouragement to the slow and cheap canal traffic than a territory like ours, sparsely settled, and with cities far apart; but in cases where there is to be an obvious and immediate gain, as there would be with the Cape Cod and Florida Canals, experience shows that the value of the work will increase, rather than diminish, with time.

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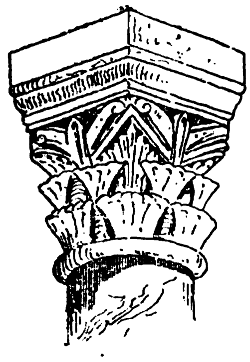
THE TWENTY-SECOND ANNUAL CONVENTION OF THE AMERICAN INSTITUTE OF ARCHITECTS.



THE 22d Annual Convention of the American Institute of Architects began in this city yesterday, about fifty members of the Institute being in attendance. President R. M. Hunt, of New York, presided. The morning session began in the Lecture-room of the Buffalo Library at 10 A. M. After calling the Institute to order, President Hunt delivered his annual address, as follows:

Fellows and Associates of the American Institute of Architects:

When I consider the duties and responsibilites of the position which you have conferred upon me, and recall to mind the ability of my predecessors, it is with feelings of gratification and solicitude that I address you upon this occasion. I beg you to accept my sincere thanks for the honor done me, and, relying upon your indulgence, will submit a few suggestions for your consideration.

But first it is my painful duty to record the loss of our late president, Thomas U. Walter, whose absence at our last convention was noted with profound regret. Mr. Walter was a man of sterling qualities, well fitted to carry out the many important works intrusted to his care. As one of the founders of this Institute he was ever diligent in furthering its aims, while his great experience, sound judgment, and genial manner endeared him to us all. To no one is the Institute more deeply indebted. The Nation, too, owes him a debt of gratitude for the grand monuments from his hand which adorn the Capital. He was a noble example of a life devoted to high professional achievements, even to the sacrifice of personal interests; and let us hope that his claim, now before Congress, will be considered in the same conscientious manner as his services were rendered. We have, furthermore, to deplore the loss of John H. Sturgis and Carl Pfeiffer, Fellows of the Institute, and among its most zealous supporters, whose works testify to their uncommon ability.

During the past year much has been done to elevate the standing of the profession. The many public and private structures throughout the land show marked improvement in design and construction, attesting not only the earnest zeal of the architect, but also the deep interest taken by the public in our art. The higher culture of the public in matters of taste and art has led to certain improvements in that much-vexed question of competition. It is already not unusual to solicit professional aid in those matters, to lay down the rules and award the prizes, so that all that is now required to insure its universal practice is the adhesion of the profession to those principles of self-respect which preclude the practitioner from taking part in any competition not properly organized. This condition of affairs is due in part, also, to the stand taken, for years past, by certain members of the profession who have uniformly declined to respond to invitations to compete, except on proper terms. Such action must eventually command the respect of the public, and ultimately secure the desired end.

An unfortunate event of recent occurrence affords convincing proof, if any were needed, of the necessity of the employment of a clerk-of-the-works on structures of importance, undertaken at distant points. The extra cost of a superintendent is trivial as compared with the risk attending the erection of a building where only an occasional supervision is given. A firm stand taken on this point would undoubtedly insure the employment of a clerk-of-the-works, as is usual in Europe.

It is to be regretted that no signal success has been gained, during the past year, toward the much needed improvement of the method followed by the Federal Government in the design and erection of the public buildings. It would seem as though the mere fact of calling attention to the present method would insure a total reorganization of this department, where so many millions are yearly expended. The wonder is that any person of good professional standing should accept the position of Supervising Architect, so absurd is it to expect any one man — be he ever so gifted — to properly fulfil the varied requirements of that office. Besides, the Nation has a right to expect that the public buildings should be at least fair examples of the architectural talent of the country, while the profession has no less a right to the Government patronage. The establishment of a Department of Public Works, as exists in other countries, would remedy the existing evil.

A standard form of contract — a great desideratum — has been prepared by your committee appointed for that purpose at the last convention, to act in conjunction with similar committees of the Western Association of Architects, and the National Association of Builders. Among other benefits secured by the introduction of a uniform contract, is that of diminishing the chances of misunderstandings arising between the owner and the contractor, and possible consequent litigation.

At the last convention your attention was called to the desirability of members furnishing all the information possible to the board of trustees concerning candidates proposed for admission to the Institute. Too great care cannot be exercised in this matter, as with increased membership our responsibilties multiply. Another important matter which demands your attention is that proper compensation should be provided for the executive officer of the Institute, — the secretary, — whose duties, already very onerous, are daily becoming more so. The reduction of the annual dues a few years since increased our financial difficulties. Might it not be advisable, therefore, under the circumstances, to augment the initiation fee and annual dues of the Fellows, if not of both Fellows and Associates, and might it not be wise to require that all members of the Institute shall be members of some of its Chapters, thereby strengthening the Chapters, and equalizing, while diminishing, the burden on individual members?

Let us now consider briefly the present condition of the profession, noting what has been accomplished, and what remains for us to do. Since the foundation of the Institute in 1857, the standing of the profession has greatly improved. This is due in a great measure, if not chiefly, to the establishment of that good fellowship among its members which has led to professional esteem and healthy rivalry in place of a certain distrust formerly existing among members of the profession personally unacquainted with each other. If no other result had been accomplished, we should have reason to congratulate ourselves. The establishment of mutual respect and personal consideration among the members of the profession has led to the following, among other benefits, to the community, and to the profession, viz.: Progress in architecture, its cognate arts and industries; the establishment of a proper schedule of charges, and improvements in the building laws. While the growing interest in architecture shown by individuals and corporations has led to art publications and the establishment of technological and art schools, still much remains to be done to secure for our noble profession that high position which it justly holds in the Old World. Toward this end, it is of paramount importance that all architectural societies of the country should be under one direction. The old adage "In unity there is strength" is especially applicable to us. Our united efforts to reorganize the Government method in regard to public buildings should be unceasing until crowned with success.

A bill "To establish a National Art Commission" to report on plans for public buildings, monuments, and works of art has passed the Senate and is now before the House of Representatives. It is to be hoped that it may become a law. A similar commission should be established in every community to insure correct designs and good construction. A striking proof of the necessity of such a board is furnished by the present chaotic state of the proposed library at Washington. The Capitol at Albany furnished another example. Such a condition of affairs would hardly have been possible had these buildings, from the start, been intrusted to a competent commission comprising one or more experienced men of our profession. Striking blunders of this sort are of too common occurrence — of buildings costing double the amount proposed to be expended, others unfit oftentimes for their intended uses, etc., and although the architect is not unfrequently blamed for these mistakes, the fault generally is attributable to the incompetency of the committee in charge. The attainment of these two objects is of the greatest importance, and we should do all in our power to accomplish them. It is a duty we owe to the public, who should be ever ready to give us aid and support, and who should rightfully expect us to direct in matters relating to our craft.

A more direct and lively interest should be taken by the profession in the architectural and technical schools, which have already attained to a high degree of excellence under the able direction of those in charge of them. Lectures and conferences by the active members of the profession might accomplish much in the training of those who so soon are to take our places.

In conclusion, we have reason to be satisfied with the results of our past labors. Let us therefore take renewed courage and steadfastly pursue our good work, each and every member remaining loyal to our motto, "Truth and Unity."

The session was devoted to the reading of reports from the officers and the special committees. The special committees submitted reports on these subjects:

On consolidation of architectural societies; on a bill to provide improved methods in the architectural service of the Federal Government, jointly with special committee of the Western Association of Architects; on the uniform building contract, prepared jointly by the Institute, the Western Association of Architects, and the National Association of Builders; on a formula for Chapter reports; on providing a permanent home for the Institute, and on indemnification of Mr. Bloor.

Mayor Becker next delivered a brief address of welcome, tendering the visitors the hospitality and freedom of the city.

The afternoon programme included a trip to Niagara Falls, the visitors being the guests of the Buffalo architects.

In the evening the exhibit of drawings was opened and attracted much attention. A portion of the Fine Arts Gallery was given up for this purpose, and 118 different drawings were exhibited. The largest was a design map of the proposed South Buffalo Park. Several Buffalo architects are well represented. The exhibit of drawings for church interiors, windows, and Tiffany's plans for parlor decorations in Persian, Moorish, and English Renaissance styles are notably fine.

The evening session was given up wholly to a discussion of the report of the special committee on consolidation. Mr. W. W. Carlin of this city is a member of the committee. They submitted a lengthy plan of consolidation of all the architectural associations in the United States, and the convention decided to take up the report and act on it seriatim.

Mr. Adler, of Chicago, President Smith of the Western Association of Architects, and others favored consolidation, and after considerable discussion the first proposition, the name of the proposed federation shall be "The American Institute of Architects," was adopted unanimously. The second proposition was as follows: Any architectural association which shall adopt the "condition of membership" which has prevailed in the old A. I. A., viz., "the honorable practice of the profession," may become part of the new organization. This drew out a very animated and extensive debate, and was not acted upon. Mr. Briggs provoked the discussion on the advisability of consolidation by suggesting that it would be better for the Western Association to come in as individuals.

Mr. Adler, representing the Western society, instantly jumped to his feet and declared that he was a member of both organizations, but that the Western society had three times as many members as

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the Institute and had vitality enough to exist without the Institute. The Western Association did not ask, but was asked to join the Institute.

Mr. Briggs feared the new members would dominate the Institute.

Mr. Cutler, of Rochester, thought that Mr. Briggs was mistaken. The Institute had taken the initiative, and was committed to amalgamation.

Mr. Carlin said it would be unfair to compel members of other societies to pay initiation fees.

Mr. Adler said the Western society would not join the present Institute, but was willing to join hands with the Institute and form a confederation, retaining the old name in honor of its age and prestige. The Western society sought a more democratic government than the Institute affords, and would not consent to be ruled by a Board of Managers.

President Hunt, as one of the original founders of the Institute, said they would run a dangerous risk in admitting any association as a body. It took the Institute thirty years to get 200 members, and the Western Association had received a greater membership in three or four years. There would be danger in admitting so large a number.

Messrs. Adler, Gibson, Shipman, Cutler and others debated the matter thoroughly and several resolutions were offered and withdrawn. Finally a resolution, sustaining the action taken at the last annual convention held at Chicago, in favor of forming a confederation, was carried unanimously amid applause. The report was again taken up, and went over as unfinished business.

ANNUAL REPORT OF THE BOARD OF TRUSTEES OF THE AMERICAN INSTITUTE OF ARCHITECTS.

To the American Institute of Architects:

Since the twenty-first Convention, held in Chicago in October of last year, your Board, under the chairmanship in most instances of the President, Mr. Hunt, have held eight regular meetings, two adjourned meetings and one special meeting; their regular time for holding the monthly ones having been changed, to suit the convenience of Western members of the Board, from the third to the first Wednesday of the month.

Mr. Wm. A. Potter having positively refused to accept the Secretaryship for 1888, to which he was elected, Mr. Bloor has so far remained at the post; and Mr. Congdon having declined his re-election as Trustee, the Board, at its first meeting in the current year, appointed Mr. Littell (who has a number of times been elected to and served in that office) to fill the vacancy.

Since the last report of your Board, four (4) Associates, Messrs. Fred. H. Gouge of Utica, N. Y.; Jas. R. Willett, of Chicago; Warren R. Briggs, of Bridgeport, Conn., and F. W. Humble, of Buffalo, have been advanced to the upper grade of membership, and thirteen (13) candidates have been elected Fellows by first election, viz.: Messrs. W. Bleddyn Powell, of Philadelphia; Wm. W. Clay, of Chicago; Geo. F. Hammond, of Cleveland; Will. A. Freret, of Washington, Supervising Architect of the United States Treasury Department; W. W. Carlin, of Buffalo; A. F. D'Oench, of New York, Superintendent of Buildings; Louis De Coppet Berg, of New York; Jas. G. Hill, of Washington, ex-Supervising Architect, United States Treasury Department; Edward Clark, of Washington, Architect in charge of the United States Capitol; Chas. E. Colton, of Syracuse; M. J. Dimmock, of Richmond, Va.; H. A. Macomb, of Philadelphia, and Geo. J. Metzger, of Buffalo. The accessions to the Associateship have been seven (7) in number, viz.: Mrs. Louise Bethune, of Buffalo, and Messrs. S. Gifford Slocum, of Philadelphia; A. C. Elzner, of Cincinnati; Albert H. Kipp, of Wilkesbarre, Pa.; Jno. A. Hamilton, of New York; Willis G. Hale, of Philadelphia, and C. F. Wilcox, of Providence, R. I.

A number of other applications from candidates for professional membership are before the Board, as also letters from various parts of the country, making inquiries in reference to the possible formation of Chapters; several of which are in continuation of correspondence opened by the writers of them last year, but while the question of consolidation is pending, it has not been thought desirable to push the matter of new accessions.

To the list of Honorary Members have been added the names of Charles Chipiez, of Paris, architect and author of several valuable works on architecture and general art, and of Comandatore Rudolfo Lanciani, archæologist and Director of the Excavations in Rome; while Signor Giacomo Boni, of Venice, Architect in charge of the Ducal Palace and the Campanile of St. Mark's, has been enrolled, by first election, among our Corresponding Members; and Mr. Jno. Murdoch, of Baltimore, has been transferred thereto from the Fellowship grade. The first three gentlemen have shown much courtesy to the Willard Commission, now, in connection with the New York Chapter, engaged in adding an Architectural Department to the Metropolitan Museum of Art.

Mr. Murdoch, for many years a Fellow of the Institute and the President of its Baltimore Chapter, and latterly filling the position of Engineer of the Light-House Board, United States Treasury Department, having announced his intention of resigning, on account of devoting himself altogether to engineering practice, your Secretary asked him to reconsider his determination, for the sake of the interests of the Institute and his local Chapter. Mr. Murdoch in his rejoinder improved the occasion to animadvert on what he considered the mischievous action of the Institute in having repealed, some years ago, the law requiring its Associates to be such through the Chapters, instead of, as now, irrespective thereof; the option thus left to candidates causing them, in his opinion, as in that of others, to rest content with a title derived from the Institute at large, and, as concerns the local branch of it, to which they geographically belong, to lose that active interest in it which only would ensure, in maximum degree, the benefits derivable from frequent intercourse between the members of one fraternity. Mr. Murdoch's resignation was accepted with much regret, and it was by an immediate and unanimous vote that his continued, if comparatively slight, connection with the Institute, through the Corresponding Membership, was secured.

The resignation of Mr. E. F. Baldwin, Fellow, of Baltimore, which had been at the disposal of the Board for some time previous, was accepted at its first meeting after the last convention, thus rendering inoperative the instructions issued at that convention with reference to a solution of, and termination to, his controversy with a member in his own locality.

At the last convention the precarious condition of the President of the Institute, Dr. Thomas U. Walter, was a matter of grave concern. Ten days after its close, he died in Philadelphia, his funeral being attended by the President elect, and other members of our organization.

At the first meeting of your Board, Dr. Walter's pupil, Mr. N. Le Brun, and the President of the Philadelphia Chapter, Mr. T. P. Chandler, Jr., were appointed a committee to prepare suitable resolutions in reference to the melancholy event, and this Convention will presently be favored with these resolutions, and with an admirable memoir of Dr. Walter's professional life, prepared by an ex-Secretary of the Institute, Mr. Geo. C. Mason, Jr. At the June meeting was presented a copy received from the Western Association of Architects, of appropriate resolutions passed by that body in memory of Dr. Walter.

The necrological list for the year includes two other names — one that of Mr. Jno. H. Sturgis, a Fellow of the Institute up to his decease, and the other that of a past Fellow, Mr. Carl Pfeiffer. The Board passed suitable minutes in their honor, that of Mr. Sturgis, prepared by Mr. Kendall, as follows:

"The Board of Trustees desires to express its appreciation of the great loss the profession has sustained through the recent death of Mr. Jno. H. Sturgis, at St. Leonards-on-Sea, England.

"Mr. Sturgis, who was one of our early members, and a Fellow for nearly a quarter of a century, always took a deep interest in the welfare of the Institute, and, whenever practicable, was present at its annual conventions, and took an active part in them.

"For many years he was the Vice-President of the Boston Chapter, to whose service he was always ready to devote his social accomplishments and his professional talents.

"His works are characterized by intelligent treatment of mass, and by especial thoughtfulness and refinement of detail, and it may, without hesitation, be said that his influence, from first work to last work, has been increasingly a salutary one; so great, indeed, has it been, that we may well wish to leave to those who follow us, so good and fruitful a record toward the artistic, constructional, executive and social advance of the profession, as Mr. Sturgis has left to us."

The following in memorial of Mr. Pfeiffer was prepared by the Secretary:

"*Resolved*, That the Board of Trustees of the American Institute of Architects have heard with deep regret of the death, five days ago, of Mr. Carl Pfeiffer, for several years a Trustee and, for two years the Secretary of the Institute, and the architect of the Presbyterian Church, cor. Fifth Avenue and Fifty-fifth Street, the Unitarian Church of the Messiah, the Roosevelt Hospital, the Insane Asylum at Middletown, the Colored Orphan Asylum, the Berkshire Apartment-House, and many other important structures."

In both cases the resolutions were forwarded to the widows of the deceased members.

Dr. Walter's widow has endeavored since her husband's decease to collect a claim of his to a large amount against the United States Government for professional services rendered by him in designing and executing the completion of the National Capitol at Washington and a number of other Federal buildings, and your Board, feeling the justice of the claim, has afforded her all the assistance in its power, the Secretary having had much correspondence on the subject with various parties, and sending to all the Chapters suggestions toward influencing a favorable consideration of the subject in Congress. The present status of the matter is that some time ago the Committee on Claims of the House of Representatives reported in favor of a settlement by the payment of a sum considerably less than a quarter of that claimed, and that Mrs. Walter's attorney had advised against further action by the Institute in the matter until it should be taken up in the Senate.

The Secretary has, during the year, been called on to furnish the editors of two well-known cyclopædias with biographical details of American architects, and has furnished them in the cases of parties deceased, but, in the case of living practitioners, has referred his inquirers to the parties themselves.

At an early meeting Messrs. Littell and Kendall were appointed a Special Committee, with power, to make a fitting response to the propositions offered by the promoters of the Grant Monument Com-

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petition. They did so in a letter to ex-Governor Cornell, Chairman of the Committee that have the matter in hand (which was acknowledged by Secretary Greener), and copies were forwarded to each Chapter of the Institute. The letter was published generally in the architectural serials, and received the official commendation of several of the Chapters and of the Western New York State Association of Architects.

For the current information of the Board, the Special Committee on Improving the Architectural Service of the Federal Government reported the result of their interview with Mr. Freret, the Supervising Architect of the Treasury Department. This information, in condensed form, will presently be laid before you separately in the report of that Committee.

The services of the Board in settling a dispute between an architect and his client have again been asked for and refused, in accordance with the rule confining advice and adjudication on the part of the Board only to members of the Institute.

The Secretary being informed by another architect that he had recovered by legal process from a recalcitrant client the principal and interest of a bill for partial service to its full amount of nearly $2,000, the architect's charges being made in accordance with the Institute schedule, his opponent's counsel had endeavored to influence the court and jury by making the point that the schedule was the production of a combination of architects existing for the purpose of insisting upon an extortionate rate for services. The Secretary, in his rejoinder to his correspondent, had pointed out that it was very fortunate for him and others that the Institute had so firmly established its prestige and its schedule; that it is an easy thing for a reputable architect and his lawyer — if the latter is sufficiently competent and tenacious — to go into court and collect to the full on its several items, as, also, that the reputation of the *personnel* of the organization is so high that the false charge that it is a combination of architects for the exaction of extortionate rates for professional services has no effect on a jury.

Two of the foreign Honorary Members have enriched the Library of the Institute during the year; one, Mr. P. J. L. H. Cuypers, of Amsterdam, having made it a donation of fifty-eight engravings and wood-cuts, illustrating eighteen churches designed and executed by himself in various localities in Holland; the other, Professor Gottgetreu, of Munich, contributed a copy of his "*Lehrbuch der Hoch Konstruktionen*," with accompanying atlas. The American Society of Civil Engineers, the Royal Institute of British Architects, and the *Société Centrale des Architectes* continue to forward their transactions; while copies of architectural and engineering serials are regularly received from various points in Europe, and one from the East Indies.

A letter from Secretary Normand S. Patton of the Western Association of Architects, on behalf of that Association's Committee on the Metric System, advocating its use for weights and measures, and referred by the last Convention to your Board with power, has several times been presented, laid on the table, taken up at a subsequent meeting, and occasioned some discussion, but without further result.

To your Secretary was referred, by a member of the Institute, a letter from a clergyman connected with the proposed Babylonian Expedition, and asking where a young architect might be found who would be willing to accompany the expedition as architect, without salary and at his own expense. The Secretary communicated his request to several parties, but without result.

At the June meeting the Board appointed two of its members, Messrs. Littell and Bloor, to act as a Committee of Arrangements for the current convention, to be held in Buffalo, preferably in the third week in October, and at the September meeting Mr. Carlin was appointed local coadjutor thereon.

Your Board would call the attention of the Convention to the fact that the experiment of a reduction of the dues made some years ago has not proved to be a financial success, and that, in order to properly perform the work of the Institute, the revenue should be at least double the amount that it is at present. It is well known that the dues of other like associations are greatly in excess of those of the Institute.

This convention will probably yield to no previous one in the importance, so far as Associative interests are concerned in the questions that will come up for discussion, and it is to be fairly expected that they will meet in that broad public spirit which can alone deal with themes involving more than local conditions and individual preferences.

Respectfully submitted for the Board of Trustees by

A. J. BLOOR, *Secretary.*

October 17, 1888.

REPORT OF P. L. LE BRUN, ESQ., AGENT OF THE WILLARD ARCHITECTURAL COMMISSION.

NEW YORK, October 10, 1888.

To Messrs. N. Le Brun, Pres., A. J. Bloor, Sec., and Emlen T. Littell, Willard Architectural Commissioners:

Gentlemen,— I have at last the honor to report to you that the installation of the Willard Architectural Collection in the main hall of the older portion of the Metropolitan Museum of Art is a matter of the immediate future, and only awaits the transfer of the objects lately exhibited there to their spacious new quarters in the enlarged museum.

The overcrowded condition of that institution for years past, necessitated the postponement of the selecting and purchasing of the casts, until provision was assured for their proper disposition and display. This enforced delay has, however, been of advantage to the fund, placed at your disposal by the terms of the bequest, in the accumulation of four years' interest on the money devised. It has also permitted a more deliberate maturing of the work of selection.

The construction of the Museum additions having apparently progressed last autumn sufficiently to warrant the purchasing of casts, your agent made his second trip to Europe, under your direction, for this purpose. Of the casts he then secured, the larger portion, or two hundred and fourteen cases, have arrived — leaving about eighty cases yet to come.

These boxes remain still unopened in the cellars of the Museum, owing to the lack of space required for properly distributing and sorting their contents and putting together the larger objects, which are mostly shipped in many parts, requiring a careful readjustment. And, as it is the intention of the Museum authorities to reopen their collections to the public with the inauguration of their new extension, about the middle of December next, it will be impossible within that limited time to mount and prepare the Willard casts for exhibition. Much as this is to be regretted, it seems to have been unavoidable.

Since my last report, the Museum has added the West Court — formerly devoted to the modern sculpture — to the uses of the Willard Collection. This and the placing of the principal entrance to the Architectural Court in the centre of the south side of the main room have brought about a few unimportant shiftings of the arrangement outlined in that report, but its main features will remain the same, and the collection will be distributed likewise with a view to its extension northward, when the additions on that side are built — as will be inevitably required in the future.

Within the limits of this communication it will be unnecessary to allude specifically to any but some of the more prominent objects thus far purchased. In the scheme of the collection, typical models of entire buildings, made to a sufficiently large scale to permit of the accurate reproduction of detail, were assigned an important position. They are to form central crowning illustrations of the peculiar features of each important style, around which are to be grouped castings of detail, photographs and works of reference.

A number of estimates were obtained from specialists, and contracts were made with a skilled sculptor of Paris for the production (as a commencement) of models of the Parthenon, and of the Cathedral of Paris, made to the uniform scale of one-twentieth full size.

They are well-advanced, and from photographs lately received of the portions already finished, promise to be very successful. In these models, all the applied sculptures and carving are to be faithfully reproduced. Of Nôtre Dame Cathedral the exterior only will be shown, but of the Parthenon both the exterior and interior will be equally finished.

The architectural fidelity of these models may be estimated, when it is stated that they are being made under the direct supervision of that distinguished French architect, Monsieur Charles Chipiez, who stands among the first of living authorities on architectural archæology and history. This gentlemen, with a generosity and fraternally artistic feeling that cannot be too highly appreciated, placed his services, on my application, at the disposition of the Willard Commission, and has supplied the sculptor with the drawings necessary to elucidate doubtful points in the construction of the Parthenon, as to which temple he has made extended special and original researches in connection with his work (in collaboration with Monsieur Perrot) on the forthcoming volume of their "*Histoire de l'art dans d'Antiquité.*" His solution of the disputed points as to the manner of admitting the light to the interior, and of the external and internal polychromy of the building, will prove most interesting and valuable. And we may confidently share his expressed hope, that the Willard model of the Parthenon "will give of that superb edifice, which is so capital for instruction, an exact and complete idea; and that it will produce a certain impression on the public." To heighten the realistic effect of the work, in addition to the reproduction of the Phidian statue of Athene Parthenos, the temple will contain a number of portable votive offerings and other artistic treasures, lists of which have been handed down to us.

The educational value of such an exhibit may be estimated, when it is pictured surrounded by casts of the various architectural members of the building, the large pedestal of the model hung with restorations in tint and black and white, and photographic views, the reference library near at hand, with the standard works of Michaelis, Bötticher and Penrose and others. And in a contiguous court (provided by the munificence of Mr. Marquand) a complete collection of casts of every known fragment of sculpture of this noblest edifice, friezes, metopes and pediments. Could the study of its subtle æsthetic beauties be possibly better facilitated?

As to the magnificent model of the cathedral of Nôtre Dame, its execution will be facilitated greatly by the sculptor's access to the numerous drawings and studies of Viollet-le-Duc — made at the time of the restoration of this building — drawings which the kindness of the diocesan architect has placed at his disposition. All the sculptures, in the round and in relief, and the carving will be rendered with as strict accuracy as the scale admits; and the photographs of

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the lowest section of the façade, with its rich, deeply recessed triple portals and the gallery of kings above, when compared with photographs taken directly from the building, show a remarkable fidelity to the original, not only in the general feeling, but in the minuter details of the sculpture.

As to the "bits," — among the larger pieces are a full-sized reproduction or cast of the Erectheion Portico of the Caryatides; a model of the Choragic monument of Lysicrates, one-tenth full size; one complete bay of the Cloister of St. John Lateran, with the mosaics colored as in the original; the pulpit front of Sant' Ambrogio, at Milan; the celebrated choir-screen of St. Michael's, at Hildesheim; the interesting carved wooden doorways of Aal and Flaa, Norway; the pulpit of Siena Cathedral; the Shrine of Saint Sebaldus, Nuremburg; the doorway of the large hall in the Palazzo Vecchio, Florence; the tabernacle of Sta. Maria in Trastevere; Monument of Count Bougival, at Breda; Jean Goujon's doorway from St. Maclou, Rouen; a model of the façade of the Knockenhauer Amsthaus (called the finest carved wooden building in Germany), made in finest style at one-tenth scale, and colored as in the original.

Numerous smaller bits have been also secured to the number of about nine hundred and fifty. But the work of selecting and purchasing may be said to be only fairly begun. The casts already bought represent but a portion — the bony framework, as it were — of what will eventually form the Willard Collection, whose formation will be necessarily the work of time. The completing of the series of models alone will take several years.

The commencement which this report outlines should, however, prove a sturdy start in a most important undertaking, and should wake up architects and artisans and the architecture-loving public of New York to a realizing sense of the duties which the inauguration of such a collection imposes — the duty, profit and pleasure of study — the duty and privilege of patronizing and enlarging its scope. For, to carry out fully the ambitious programme of its initiator and public-spirited testator, the means yet unexpended will, from present indications, be exhausted before the Willard Collection acquires such organic completeness and rounded fulness as will make of it truly *an historical epitome of the art.*

Very respectfully, your obedient servant,

P. L. Le Brun.

ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

SEVER HALL, CAMBRIDGE, MASS. H. H. RICHARDSON, ARCHITECT.

[Gelatine Print, issued only with the Imperial Edition.]

THE REJECTED DESIGN FOR THE CONGRESSIONAL LIBRARY, WASHINGTON, D. C. MR. J. L. SMITHMEYER, ARCHITECT, WASHINGTON, D. C.

THE design contemplates a structure in the Cinquecento style, built opposite the south wing of the United States Capitol, and about one thousand (1,000) feet to the east of it. The site is nearly five hundred and seventy-five (575) feet square, and the building is about four hundred and sixty (460) feet by three hundred and thirty-seven (337) feet.

Its capacity for storing books, when the outer rooms will have been filled with books, is estimated at from seven (7) to eight (8) million volumes, at the rate of eight books per foot. Until then, these rooms may serve as galleries for the exhibition of articles of the graphic arts in the Copyright Department, and also as a nucleus for the collection of a future National Art Gallery. The central reading-room is one hundred (100) feet in diameter, is octagonal in form, and covered with a dome-shaped roof of iron and terra-cotta. It is lighted by large windows in the sides of the octagon, and by a large sky-light in the dome. The proportion of the illuminating surface to the space illuminated is as one (1) to one hundred and ninety (190). The walls around the reading-room are provided with alcoves, which will hold two hundred and sixty thousand (260,000) volumes. This room connects with the adjacent book repositories. There will be a spacious gallery for spectators all around that room, above the alcoves, which is a height sufficiently above the floor of the reading-room not to disturb the readers and students below.

The entire building will be absolutely fireproof. Each book repository will be isolated from the others by heavy walls and double-thick iron doors filled with asbestos. The building will be heated by steam and ventilated by the down-draught system, which prevents the heat and dust from rising and accumulating in the upper strata of the rooms and on the upper book-shelves. The floors will be in marble and tiles, and the roofs, floor-beams, galleries, book-racks, etc., will be of iron.

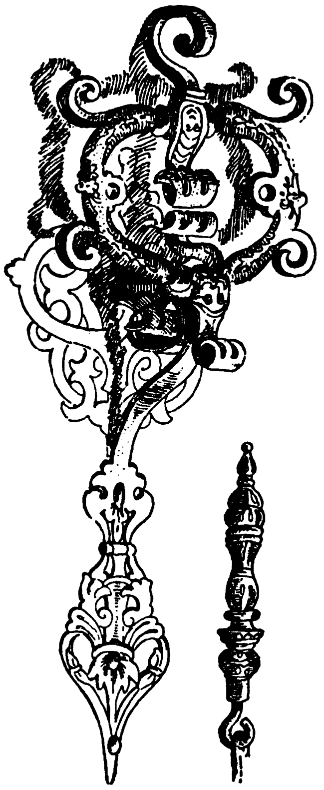
The book-shelves will be of rubbed slate. No combustible materials will be used in the library proper. The arrangements of rooms, their sizes, etc., are strictly in keeping with the "Prospectus" prepared in 1872 by the Commission of Judges appointed by Congress to sit in judgment of the plans submitted to competition by twenty-eight architects from the United States and England. This Commission was composed of Senators Morrill and Howe and A. R. Spofford, Librarian of Congress. This Commission selected at that time the design of Architects Smithmeyer and Pelz as the best. It has since passed through the ordeal of a limited competition with three selected competitors, and an open and continuous one with thirteen competitors, lasting for several years, and resulting in its final adoption by Congress in 1886, and in the commencement of its erection.

As soon as the transfer of the property purchased by the Government for the library site was effected, actual work was commenced. The drainage of the site was at once laid, the excavations were made for the cellar and trenches, concrete work was done, and a large quantity of the dimension stone for the cellar walls was delivered on the premises, ready for putting into the structure.

At this stage of progress Congress abolished the Commission, rescinded all former acts and contracts bearing on this subject, stopped all work, and placed the entire management in the hands of the Chief of Engineers, U. S. A., who was authorized to prepare a new design for a building, the entire cost of which is to be limited to four million dollars ($4,000,000), exclusive of the five hundred thousand dollars ($500,000) already appropriated and partly expended.

HOUSE OF A. J. KENNEDY, ESQ., MINNEAPOLIS, MINN. MR. L. S. BUFFINGTON, ARCHITECT, MINNEAPOLIS, MINN.

BEARING POWER OF SOILS.



IT is scarcely necessary to say that soils vary greatly in their bearing power, ranging, as they do, from the condition of hardest rock, through all intermediate stages, to a soft or semi-liquid condition, as mud, silt, or marsh. The best method of determining the load which a specific soil will bear is by direct experiment; but good judgment and experience, aided by a careful study of the nature of the soil — its compactness and the amount of water contained in it — will enable one to determine with reasonable accuracy its probable supporting power. The following data are given to assist in forming an estimate of the load which may safely be imposed upon different soils:

Rock. — The ultimate crushing strength of stone, as determined by crushing small *cubes*, ranges from 180 tons per square foot for the softest stones — such as are easily worn by running water or exposure to the weather — to 1,800 tons per square foot for the hardest stones. The crushing strength of slabs, *i. e.*, of prisms of a less height than width, increases as the height decreases. A prism one-quarter as high as wide is two or three times as strong as a cube of the same material. If a slab be conceived as being made up of a number of cubes placed side by side, it is then easy to see why the slab is stronger than a cube. The exterior cubes prevent the detachment of the disc-like pieces from the sides of the interior cubes; and hence the latter are greatly strengthened, which materially increases the strength of the slab. In testing cubes and slabs, the pressure is applied uniformly over the entire upper surface of the test specimen; and, reasoning by analogy, we may then conclude that when the pressure is applied to only a small part of the surface, as in the case of foundations on rock, the strength will be still further increased.

That a unit of iron has a much greater power of resistance when it forms a portion of a larger mass than when it is isolated in the manner customary in making experiments on resistance to compression, is conclusively proven by the following experiment: A one-inch round bar of soft Lowmoor iron, eight or nine inches long, was planed on two opposite sides to a thickness of three-fourths of an inch, and pressure was applied on one side of it with a steel die one-half an inch square. The compressive strength of the iron, as determined in the usual manner, was 27,000 pounds per square inch; but, under the conditions stated, a load of 53,760 pounds per square inch was required to produce the slightest perceptible indentation, and 89,600 pounds per square inch produced an indentation only about one sixty-fourth of an inch deep. Essentially the same thing is shown by everyday railroad practice. The pressure at the point of contact

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between the drive-wheels and the rails is, at least, twice the compressive resistance of the metal in the rail, and yet the latter is not even indented, however long the wheel may remain at rest.

Clay, which for years has safely carried one and one-half to two tons per square foot (twenty to twenty-eight pounds per square inch), when tested in the form of cubes, crushed under four to eight pounds per square inch.

Therefore, we conclude that the compressive strength of cubes of a stone gives little or no idea of the ultimate resistance of the same material when in thick layers in its native bed.

The safe bearing power of rock is certainly *not less* than one-tenth of the ultimate crushing strength of *cubes*; that is to say, the safe bearing power of solid rock is *not less* than eighteen tons per square foot for the softest rock, and 180 for the strongest. It is safe to say that almost any rock, from the hardness of granite to that of a soft, crumbling stone, which is easily worn by exposure to the weather or to running water, when well bedded, will bear the heaviest load that can be brought upon it by any masonry construction. It scarcely ever occurs in practice that rock is loaded with the full amount of weight which it is capable of sustaining, as the extent of base necessary for the stability of the structure is generally sufficient to prevent any undue pressure coming on the rock beneath.

Clay. — The clay-soils vary from slate or shale, which will support any load that can come upon it, to a soft, damp clay, which will squeeze out in every direction when a moderately heavy pressure is brought upon it. Foundations on clay should be laid at such depths as to be unaffected by the weather, since clay, at even considerable depths, will gain and lose considerable water as the seasons change. The bearing power of clayey soils can be very much improved by drainage, or by preventing the penetration of water. If the foundation is laid upon undrained clay, care must be takeu that excavations made in the immediate vicinity do not allow the clay under pressure to escape by oozing away from under the building. When the clay occurs in strata not horizontal, great care is necessary to prevent this flow of the soil. When coarse sand or gravel is mixed with the clay its supporting power is greatly increased, being greater in proportion as these materials are greater. When they are present to such an extent that the clay is just sufficient to bind them together, the combination will bear as heavy loads as the softer rocks.

The following data on the bearing power of clay will be of assistance in deciding upon the load that may safely be imposed upon any particular clayey soil: From the experiments made in connection with the construction of the capitol at Albany, N. Y., the conclusion was drawn that the extreme supporting power of that soil was less than six tons per square foot, and that the load which might be safely imposed upon it was two tons per square foot. "The soil was blue clay, containing from 60 to 90 per cent of alumina, the remainder being fine siliceous sand. The soil contains from 27 to 43, usually about 40, per cent of water; and various samples of it weighed from 81 to 101 pounds per cubic foot." In the case of the Congressional Library, the ultimate supporting power of "yellow clay mixed with sand" was 13½ tons per square foot, and the safe load was assumed to be 2½ tons per square foot. Experiments made on the clay under the piers of the bridge across the Missouri, at Bismarck, with surfaces 1½ inches square, gave an average ultimate bearing power of fifteen tons per square foot.

The stiffer varieties of clay, when kept *dry*, will safely bear from four to six tons per square foot; but the same clay, if allowed to become saturated with water, cannot be trusted to bear more than two tons per square foot. At Chicago, the load ordinarily put on a thin layer of clay (hard above and soft below, resting on a thick stratum of quicksand) is 1½ to 2 tons per square foot; and the settlement, which usually reaches a maximum in a year, is about one inch per ton of load. Experience in central Illinois shows that, if the foundation is carried down below the action of the frost, the clay subsoil will bear 1½ to 2 tons per square foot without appreciable settling. Rankine gives the safe load for compressible soils as 1¼ to 1¾ tons per square foot.

Sand.— The sandy soils vary from coarse gravel to fine sand. The former, when of sufficient thickness, forms one of the finest and best foundations; and the latter, when saturated with water, is practically a liquid. Sand when dry, or wet sand when prevented from spreading laterally, forms one of the best beds for a foundation. Porous, sandy soils are, as a rule, unaffected by stagnant water, but are easily removed by running water; in the former case they present no difficulty, but in the latter they require extreme care at the hands of the constructor.

Compact gravel or clean sand, in beds of considerable thickness, protected from being carried away by water, may be loaded with 8 to 10 tons per square foot with safety. In an experiment in France, clean river-sand, compacted in a trench, supported 100 tons per square foot. Sand well cemented with clay and compacted, if protected from water, will safely carry 4 to 6 tons per square foot.

The piers of the Cincinnati suspension-bridge are founded on a bed of coarse gravel 12 feet below low water, although solid limestone was only 12 feet deeper; if the friction on the sides of the pier be disregarded, the maximum pressure on the gravel is 4 tons per square foot. The piers of the Brooklyn suspension-bridge are founded 44 feet below the bed of the river, upon a layer of sand 2 feet thick resting upon bed-rock; the maximum pressure is about 5½ tons per square foot.

At Chicago, sand and gravel about 15 feet below the surface are successfully loaded with 2 to 2½ tons per square foot. At Berlin the safe load for sandy soil is generally taken at 2 to 2½ tons per square foot. The Washington Monument, Washington, D. C., rests upon a bed of *very* fine sand 2 feet thick underlying a bed of gravel and boulders, the ordinary pressure on certain parts of the foundation being not far from 11 tons per square foot, which the wind may increase to nearly 14 tons per square foot.

Semi-liquid Soils. — With a soil of this class, as mud, silt, or quicksand, it is customary (1) to remove it entirely, or (2) to sink piles, tubes, or caissons through it to a solid substratum, or (3) to consolidate the soil by adding sand, earth, stone, etc. Soils of a soft or semi-liquid character should never be relied upon for a foundation, when anything better can be obtained; but a heavy superstructure may be supported by the upward pressure of such a soil, in the same way that water bears up a floating body.

According to Rankine, a building will be supported when the pressure at its base is $w\,h\left(\frac{1+\sin x}{1-\sin x}\right)^2$ per unit of area, in which the expression w is the weight of a unit volume of the soil, h is the depth of immersion, and x is the angle of repose of the soil. If $x = 5°$, then according to the preceding relation the supporting power of the soil is 1.4 $w\,h$ per unit of area; if $x = 10°$, it is 2.0 $w\,h$; and if $x = 15°$, it is 2.9 $w\,h$. The weight of soils of this class, that is, mud, silt, and quicksand, varies from 100 to 130 pounds per cubic foot. Rankine gives this formula as being applicable to any soil; but, since it takes no account of cohesion, for most soils it is only roughly approximate, and gives results too small. The following experiment seems to show that the error is considerable. A 10-foot square base of concrete resting on mud, whose angle of repose was 5 to 1 [$x = 11\frac{1}{3}°$], bore 700 pounds per square foot. This is 2½ times the result by the above formula, using the maximum value of w.

Large buildings have been securely founded on quicksand by making the base of the immersed part as large, and at the same time as light, as possible. Timber in successive layers, or grillage on piles, is generally used in such cases. This class of foundations is frequently required in constructing sewers in water-bearing sands, and though apparently presenting no difficulties, such foundations often demand great skill and ability.

It is difficult to give results of the safe bearing power of soils of this class. A considerable part of the supporting power is derived from the friction on the vertical sides of the foundation; hence the bearing power depends in part upon the area of the side surface in contact with the soil. Furthermore, it is difficult to determine the exact supporting power of a plastic soil, since a considerable settlement is certain to take place with the lapse of time. The experience at New Orleans with alluvial soil, and a few experiments that have been made on quicksand, seem to indicate that with a load of ½ to 1 ton per square foot the settlement will not be excessive.

Summary. — Gathering together the results of the preceding discussion, we have the following table:

BEARING POWER OF SOILS.

KIND OF MATERIAL.	Bearing Power in tons per sq. ft	
	Min.	Max.
Rock — the hardest — in thick layers, in native bed	200	
Rock equal to best ashlar masonry	25	30
Rock equal to best brick masonry	15	20
Rock equal to poor brick masonry	5	10
Clay on thick beds, always dry	4	6
Clay on thick beds, moderately dry	2	4
Clay soft	1	2
Gravel and coarse sand, well cemented	8	10
Sand, compact and well cemented	4	6
Sand, clean, dry	2	4
Quicksand, alluvial soils, etc	0.5	1

Conclusion.— It is well to notice that there are some practical considerations which modify the pressure which may safely be put upon the soil. For example, the pressure on the foundation of a tall chimney should be considerably less than that of the low massive foundation of a fireproof vault. In the former case a slight inequality of bearing power, and consequent unequal settling, might endanger the stability of the structure; while in the latter no serious harm would result. The pressure per unit of area should be less for a light structure subject to the passage of heavy loads — as, for example, a railroad viaduct — than for a heavy structure, subject only to a quiescent load, since the shock and jar of the moving load are far more serious than the heavier quiescent load.

IRA O. BAKER, C. E.

KHOJA AHRAR MOSQUE AT TASHKEND. — The *Turkestan Gazette* gives the following account of the opening of the restored mosque of Khoja Ahrar in Tashkend, said to be over 400 years old: "The opening ceremony of this mosque, restored by the Russian Government, was held in the presence of Gen. Rosenbach, Governor-General of Turkestan. After the religious function the Imam of the parish gave an address, describing the benefits conferred by the Russian Government, and stating that never had the native population of Turkestan enjoyed so tranquil and prosperous an existence as now. He concluded by asking the Mohammedans present to join in a prayer for the Czar. This the audience did, raising their arms."

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WITH THE BRITISH ASSOCIATION AT BATH.

THE monotony of the Bath off-season has been relieved by the annual meeting of the British Association for the Advancement of Science, which has been numerously attended, the old Roman city of Aquæ Solis, with its numerous archæological associations and picturesque surroundings, presenting a complete contrast from the busy hum of last year's meeting at Manchester.

In his inaugural address, the new President, Sir Frederick Bramwell, C. E., reminded his hearers that science cannot be made useful to mankind without being applied; that the business of the civil engineer was to apply the discoveries of the scientists, and that, in this application, success greatly depends on the attention paid to the minutest details.

The great feature of the meeting was Professor Ayrton's address on the "Electrical Transmission of Power," the various applications of which — lighting, signalling, propulsion, welding, etc. — were exemplified by brilliant and thoroughly successful experiments. Not only did the Professor weld iron and steel bars by the electric current, but even that refractory metal, aluminium. In speaking of electric lights, he said: "We laugh a good deal at the rough-and-ready manner adopted on the other side of the Atlantic, but every English engineer who has travelled in America comes back fully impressed with the enterprise of the people and their happy-go-lucky success. They have twenty-two electric tramways, carrying some four million passengers annually, to our four electric tramways. The American plan of basing a conclusion on experience, rather than on anticipation, is not a bad one; and, if we follow that plan, taking into account that there are 75,000 arc-lamps alight every night on the Thomson-Houston high-potential circuits throughout the world, and the comparatively small number of people that have suffered in consequence — not one outside the staff — we are compelled to conclude that high potential now is what thirty miles an hour was half a century ago — uncanny, rather than dangerous."

Professor Bonney's lecture on "The Foundation Stones of the Earth's Crust" dwelt chiefly with the structural character of the gneissic and schistose rocks of the Laurentian and Huronian systems of Canada, and of the pre-Cambrian period of the British Isles, which were considered to have been formed under peculiar conditions incidental to the first deposits of sedimentary strata upon the still hot material of the previously fluid globe. The lecture was illustrated by microscopic enlargements of rock-sections about a quarter of an inch in diameter. Sir John Lubbock, Bart., lectured to the operative classes on the "Customs and Ideas of Savage Races."

There were two *soirées* in the Assembly Rooms, one given by the Mayor, and the other by the Organizing Committee. The latter was particularly successful, as a great number of microscopes were shown by their makers. Edison's phonograph formed a great attraction all through the meeting, members, especially the fairer portion, patiently waiting their turn for hours together, as only a certain number were admitted at a time.

In the Zoological Department of the Biological Section, Professor Marsh, who has devoted the greater part of his life to the exhumation and restoration of the remains of numerous extinct animals found in the Western States of America, gave an interesting account of the nearly complete restoration which he had been able to make of the *Brontops robustus*, or Cuban horse, an animal allied to the modern rhinoceros, and a life-size sketch of which he exhibited.

In the Geographical Section, presided over by Colonel Sir Charles Wilson, the Rev. J. Mackenzie, missionary traveller, suggested several explanations of Stanley's silence; and Sir F. De Winton reassured the members by naming the many obstructions to intelligence arriving from the interior of the Dark Continent. Mr. H. J. Mackinder gave an outline of M. de Lesseps's paper on the Panama Canal, which it was proposed to open early in 1890 with ten locks, to be afterwards superseded by excavation when the traffic should afford sufficient funds.

To the Economical and Statistical Section, Mr. M. G. Mulhall contributed a paper on "The Growth of American Industries and Wealth," in which he showed that the development of the States since 1850 — a single generation — was unparalled in the history of nations, the increase of wealth in thirty years being 514 per cent.

The paper which caused the greatest amount of interest in Section G, Mechanical Science, was that on "Underground Railway Communication in Great Cities," by Colonel Rowland R. Hazard of the United States Army, Chairman of the New York Underground Railway Company. Colonel Hazard advocated the formation, immediately under main thoroughfares, of subways, the foundation of which would be a two-foot bed of concrete about twelve feet below the surface of the roadway. On this would be erected the external boundary walls and five rows of steel columns, tied together and supporting the buckle-plates of the roof, covered-in by two inches of Trinidad asphalt; the space between the columns longitudinally to be filled in by panels of "ferflax," composed of steel wire and compressed vegetable fibre. In this way are afforded four lines of track for up and down, fast and slow traffic, and also two galleries for sewers, gas and water pipes, electric leads, etc. The advantages claimed are a minimum of excavation, a maximum of capacity, the greatest number and more equal distribution of points of support, and consequent maximum strength and stiffness. Sir Frederick Bramwell eulogized the paper, commented upon it at length, and concluded by proposing a hearty vote of thanks to the author, which was carried unanimously.

On Saturday, half-day excursions were made to the Severn Tunnel; to the New Barry Dock in South Wales; to Berkeley Castle and Church; to Bristol, Clifton, and the Avon Gorge, and other places of interest. One party visited the Roman camp at Sodbury, and another the Saxon church of St. Laurence, at Bradford-on-Avon, founded by Saint Aldhelm, Abbot of Malmesbury and first Bishop of Sherborne, A. D. 705. The church consists of a nave 25′ 2″ by 13′ 2″, and 25′ 5″ high from floor to the wall-plate; a chancel 13′ 2″ by 10′, and 18′ 4″ high, and a north porch. The building had received modern additions, and was used as a school until "discovered" by the late Canon Rich-Jones, Vicar of Bradford. The chancel window is as perfect as when first erected. This is not a bad testimonial to the weathering properties of Bath stone, confirmed by the wonderful preservation of Laycock Abbey, visited by another party of members. This structure, called Locus Beatæ Mariæ, was founded in 1232 by Ela, Countess of Salisbury, whose monumental stone, with inscription in Latin hexameters, is still to be seen in the fine cloisters. The Abbey is now used as a residence, and was shown by its owner, C. H. Talbot, J. P., whose father had more to do with the invention of photography than he has had the credit for.

There is documentary evidence that Laycock Abbey was built of stone from the Box Hill Quarry, which was inspected by this section of the visitors. Bath stone, though it has been used for building in the neighborhood since the eighth century, was not worked for more than local consumption until the driving of the Box Tunnel of the Great Western Railway in 1841 revealed the extensive beds under Box and Corsham Downs. At the present time, between two and three million cubic feet are quarried annually. Bath freestone is of the Mesozoic epoch; but the theory which gave it the name of "oolite" is now superseded by a more reasonable one, in accordance with what is observed to be now going on at some of the German springs. The water issuing from the earth, and strongly impregnated with lime, gives up that substance in minute particles as it comes in contact with the atmosphere. These particles, kept in suspension by the force of the issuing water, attract more lime by affinity until the successive accretions render the particles too heavy to be maintained by the water, and they sink to the bottom to be joined by others. Observation by a powerful microscope of a section of one of these grains reveals concentric rings, bearing out this theory of their formation. An analysis of the Corsham variety of this stone by Professor Attfield, F. C. S., shows: carbonate of lime, 97.2; oxide of iron and alumina, 1.6; silica, 1; and carbonate of magnesia, 0.2; while Mr. Kirkaldy has found a six-inch cube to stand a pressure of over three thousand pounds per square inch before cracking. The area over which the stone extends is several thousand acres, but the beds vary greatly within short distances, from six feet in one solid layer to twenty-six feet in several strata. The method of working has been but little improved since the stone was worked systematically, because no mechanical means have been found to give such good results as the primitive getting-by-hand labor. With slight exceptions, the stone is got by mine drifts and workings. A six-inch groove is holed with the pick in the parting at the top of a layer to a depth of five feet, permitting of the introduction of a hand-saw, with which a vertical cut is made at right angles to the face, down to the parting at the bottom of the layer. Another vertical saw-cut is then made about five feet from the other, but inclined towards it at the back. A slightly wedge-shaped block is thus detached on all sides but the back, and it is broken off here by driving wedges in at the bottom parting, and drawn out by a crane, assisted by crowbars. The hole thus made permits of the next block being sawn at the back, as well as side, when it is drawn out in the same way, and so on right and left. The great success achieved by Bath stone is due to its remarkable weathering properties, combined with its warm, pleasing tone and the ease with which it is wrought. It has been selected for a church at Brisbane, and has been sent to Sydney, Melbourne, and Cape Town. A consignment was once shipped to New York, but was neglected, owing to the want of a good agent to look after it.

During the meeting the old Roman baths were shown to the members by Major Davis, F. S. A. These extensive remains are of quite recent discovery, though the modern baths were to a large extent built over them, utilizing the same springs, which now yield more than three hundred gallons a minute of water at nearly 120 degrees Fahrenheit. The British Association has voted £100 towards the excavations, which have already revealed five large basins, showing that the Roman baths probably extended over six or seven acres.

Contiguous to the baths is the fine Abbey Church, the lineal successor of a monastery founded by Osric in 676 A. D., and begun, probably, by King Offa in 773, Æthelstan granting estates to the convent in 931. A charter refers to the church in 957 as a "*mira fabrica*," and King Eadgar was crowned there in 973. Though

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touches of artistic genius are wanting in the details, there is nobility of conception in the whole structure — mingled merits and defects of the period in which it was erected. A large congregation filled the Abbey on the Sunday morning of the meeting, when Dr. Barry, Bishop of Sydney, told the members that there was no antagonism between true science and religion. J. W. P.

THE GERMAN NATIONAL INDUSTRIAL EXHIBITION IN MUNICH.

No town on the Continent, perhaps, possesses the decorative instinct and habit in so trained and so widespread a degree as Munich. It is, indeed, little short of astonishing what a hold the styles of building and furnishing have upon the popular imagination. Wine shops are advertised as being in a certain "style"; the "style" of a tenement-house is mentioned in notices for renting or sale; small eating-houses even stick a placard in a window calling attention to their "old German," "rococo," or new-style rooms.

And if this strikes a stranger, he is no less impressed the longer he stays in the city, at the solidity of decorative furnishing in private homes. In place of the cramming of "old" things into rooms, the sticking up of cheap fans, bits of drapery, and so forth, on the walls, which is frequent elsewhere in the glimpses he gets into the parlors of average middle-class families with ambitious daughters, there is seen in Munich a measured and sterling aim in decoration, set by the *men* of the family. They are artists, children, brothers, relatives or friends of artists, or workmen in business houses that patronize artists, for Munich, so small as the city is, possesses nine hundred professional painters and sculptors, besides innumerable students and amateurs. For a century the fine arts have been magnificently patronized and unremittingly studied. Decorative taste comes, in consequence, from above downward, and is stamped with the indelible trait of a high origin.

And what characterizes the city marks the National Exhibition. For far from being what one sees every day in shops, the objects displayed are, for the most part, of especial worth. They are perfectly beautiful examples of their class, or successful attempts towards victory over a difficult technical process. There is little heaping up of miscellaneous and indifferently good or bad wares. And, although a price is attached to articles, the instances are few where business firms place agents on the spot for selling. Selling is done through the secretary of the Exhibition at the Fine Arts. If the accusation that Munich means to make herself the centre of industrial art in Germany be a fact, she opens her competition with measure and dignity, while the visitor gains through the rivalry that has stimulated the towns of the empire to send their very best.

Dresden sends the interior of a room ornamented with her specialty — porcelain; with enough besides to make her display of priceless value. A rumor runs to the effect of the interior being a portion of one of King Ludwig II's marvellous chambers. But it is only similar in style. The room of Ludwig II is of polished, sweet-scented violet, whereas the wood portion of the Exhibition display is a cheap substitute. What are duplicates are the wonderful garlands of porcelain flowers suspended about the grand mirrors, and mantle-piece, and substituted in place of painted patterns in the panels of the doors.

Rococo interiors are many, especially among the native Munich displays. A *salon* exhibited by an Augsburg firm is a timid acceptance of rococo in construction, with a retention, however, of the prevailing warm deep tones of the renaissance. A remarkable adoption of walnut wood, that has gone out of favor with Americans, is seen in a display of the famous firm of Ballin, where it is employed in a polished form for a state bed-room set, in the style of Louis XIV. Oak remains the favorite wood for dining-rooms and gentlemen's salons. Mahogany, that has a color harmonious with renaissance, but not the tone when polished to suit the prevailing shades of lustrous draperies, so that it has long been out of use, appears in an etched condition, in a boudoir set, covered with gray plush.

Ebony is hardly seen. White painted soft woods, on the other hand, once one of the ruling factors in the white-and-blue stuccoed halls of German castles, at the beginning of the century, come in again: this time with rococo fayence stoves. The apartment at the exhibition is not furnished in full: but in Eastern Germany I have seen these old-fashioned halls, and they make almost the best possible background for the warm-tinted toilettes of modern fashion.

A reaction against the renaissance style, which is plainly proclaimed at the exhibition, if towards the rococo alone, would necessarily abolish the tendency to over-furnish. It might free our society-rooms at least from vulgar competition through their crowd of objects with the number of guests. The rococo is *par excellence* the style for apartments destined for formal, social receptions; its inconsequences and delicacy being the very embodiments of the light wit and easy dash that mark high-bred occasional intercourse; while its cool, light tone of coloring and fewness of pieces heighten the effect of warm flesh tints and leave the company what it ought to be, the chief thing in the room. But while Munich takes a stand for rococo, other portions of the Empire retain the old German style, and rococo is hardly more cultivated than mixed or foreign styles: a so-called "English" style, and attempts at the Japanese.

I say attempts, because as the Japanese people have no furniture in their rooms in our sense, it is only an application of patterns of design, color, or technique that is practicable; the construction of pieces of furniture, such as chairs, tables, beds and sofas, must always be essentially European.

A carved cupboard from the well-known house of Kimbel, in Breslau, is a fine example of what worth the relief and free round ornamentation of Japanese bronzes can be as hints for a sister art. Schönthaler of Vienna exhibits Japanese paintings and glazing as the decoration of a pretty writing-cabinet set of cheap pine and fir wood.

Among the separate single objects of modern celebrity that are displayed amidst the tens of thousands of competing articles without names, are the gold chiselled table ornaments, given to the present Emperor William II, from the contributions of the cities of the Empire, on the occasion of his marriage, in 1881; the crystal-glass goblet, designed by Eisemenger for Lobmeyer & Co., of Vienna, from the Austrian Museum; and the bed-of-state of the ill-starred King Ludwig II.

The Exhibition building itself, finally, is worthy of note. It is extensive, yet was completed in fifty-six days, the style being an early rococo. The bulky white length of connected pavilions rises from the low, green bank of the Isar river, the water being reached with ease, by a broad flight of steps, at whose base, on either hand, reclines a marble water-nymph. In the midst of the river three giant geyser-like fountains are constructed which are illuminated at night by colored streaks of light from the shore, — a bold artistic effect of uncommon beauty. The electric lights used for illumination are engineered on the ground from the current of the same river.

Countess von Krockow.

EXCAVATIONS AT CYPRUS.

Mint Tower, Hall. Germany

The work of the Cyprus Exploration Fund, carried on by members of the British School at Athens during the past winter and spring, has been more than once referred to in these columns. We are now in a position to present our readers with a more detailed record, based upon the reports of Mr. Ernest Gardner, the Director, and of Mr. R. Elsey Smith, the architect of the expedition.

A preliminary tour of exploration was made in December by Mr. Gardner and Dr. F. H. H. Guillemard, who visited the ancient sites of Cerynia, Lapithus, Soli, an early Phœnician temple on the Limniti River, Politès Chrysokhon (probably Arsinoe) and new and old Paphos. On a later occasion Mr. Gardner also visited Amathus and Curium. Various circumstances delayed active operations until February, when Mr. M. R. James conducted the excavation of a hill called Leontari, near Nicosia, containing traces of early houses and walls, deep cuttings in the rock, a massive fort and archaic tombs. No decisive evidence was forthcoming as to the date of the massive walls of the fortress, which are attributed by some competent authorities to Roman times, but are more probably mediæval. The top of the hill, however, was occupied on the north by a network of primitive walls, mixed with early pottery and other objects pointing to a remote period, and by an early wall of fortification, replaced in later times by the massive one still extant. On the south of the hill lay tombs of an equally archaic period, which yielded about 200 vases and other objects in bronze, lead and silver. The rock of Leontari is a remarkably elevated tableland of sandstone formation rising 130 feet above the surrounding plain, and 520 feet above the sea level; it has a steep cliff at the top running all round the hill, which renders access difficult. The hill, having a circumference of nearly a mile, offers too long a line of defense for the men who could find refuge on it; advantage has, therefore, been taken of a narrow neck of land, which divides the hill into two unequal portions, to form an inner citadel of the smaller northern half. It is here that all the traces of building were found; the tombs all lie beyond the wall on the southern half of the hill. This arrangement recalls the general plan of the fortress of Tiryns, but at Leontari the inner citadel itself has a circumference of almost the same length as the whole fortress of Tiryns. Relying for the most part on the natural slopes of the hill for defense, the inhabitants only raised a wall across the isthmus at one exposed point. This wall, like all those in the northern hill, was built of small, unhewn stones, laid without mortar and carefully fitted. Nowhere, however, is there more than a single course flush

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with the ground. The wall was six feet broad, and had a large tower sixty feet square at its west end, and possibly another at the east. A few feet south of this wall are extensive remains of a far more massive structure, consisting, likewise, of two great towers and a curtain-wall. The west tower, which is the most perfect, consists of a single chamber thirty-two feet by fifty-seven feet, with walls sixteen feet thick. The curtain-wall is ten feet thick. The inner lining of the towers consists of good ashlar work, while the outer facing of the walls, above a plain base, consists of very fine rusticated work, *i. e.*, blocks having a raised centre panel with a broad chisel draught all round. The core is entirely of stone, set in a hard white mortar, and laid in courses about two feet high, containing here and there stones of the full height of the course, but mostly built of smaller stones. To sum up, we seem to have in Leontari Vouno traces of a very early settlement, as evidenced by the tombs, to which we may refer the slighter early walls, while the more massive walls belong to a later occupation, probably in mediæval times.

The principal work of the season, however, has been the excavation of the great Temple of Aphrodite at old Paphos. As one of the two or three great centres of worship in the ancient world this site seemed almost certain to yield important results. It had never been excavated, although such an authority as the Central Archæological Institute at Berlin had long held its excavation to be most desirable. Digging was begun upon February 3, and carried on without intermission until May 5. The actual site of the temple having been ascertained by the cutting of deep trenches in various directions, the whole of the accumulated earth was gradually removed, so that not only was the plan left clearly visible, but the inscriptions and other antiquities scattered about could not fail to be discovered. First, as to the temple itself. It is known to have been of great antiquity and of Phœnician origin, and it was apparently but little altered by the Greeks when they became the ruling power in the island, for nowhere on the site were found traces of any building at all resembling the usual Greek temple. In Roman times it was twice damaged by earthquake — in the early part of the first century and toward the close of the second. Each time it was restored with great magnificence, but although the Romans made important alterations and additions they do not seem to have wished to change the main character of the building, or even to any great extent the arrangement of the various parts. Coins exist of Roman times giving a view of this temple, and showing a tall central chamber or cella, with lower chambers or porticos on either side and a court in front inclosed by a wall with gates. A coin of Byblos, a town on the Phœnician coast, shows a temple of very similar structure, with a large court surrounded by a wall containing the sacred cone and entered on one side through a lofty portico. We have a tolerably full description of one building — Solomon's temple at Jerusalem — which may practically be considered a Phœnician temple, though, no doubt, modified by the circumstances of its construction. In the main there is a strong correspondence between the temple at Paphos and the account of Solomon's temple given in the Second Book of Kings. In both we get a series of large outer courts; in both a lofty central chamber of small dimensions, flanked by lower ones. Every part of the site which could be examined at all has been explored down to the rock level.

The temple stands on a considerable elevation above the sea on ground which slopes gently seaward for some distance and then dips suddenly down about a mile from the coast. . . . Though the construction is Roman, there is good ground for believing that the general character of earlier buildings is here, as elsewhere, retained; of such earlier and smaller chambers sufficient traces remain to allow of fairly accurate restoration. The stoa was probably roofed, and entered from the south by a projecting portico. Running round the walls inside is a broad platform two feet above the general floor level; from the low wall which supported this platform project a series of small corbels to carry a seat. The floor at the lower level consists of a geometrical mosaic, carefully laid in marble of delicate natural tints. This was probably the portion of the temple to which worshippers would be first admitted, and would thus answer to the outer court of Solomon's temple. Under this mosaic floor were found several inscriptions, the marble head of Eros, and various fragments of bronze and terra-cotta. North of the stoa comes the central hall, also of Roman construction, and so arranged that its south side is formed by part of the north wall of the stoa, from which no doubt it was entered direct. This hall was probably covered by a roof, and had a double line of columns, as in the great stoa on the Acropolis at Athens between the two theatres. But the walls as they stand are very imperfect. Both this hall and the stoa were of the Doric order, and some architectural fragments were recovered. The hall is of much smaller dimensions than the stoa, and seems on the north side to have opened into a great court without roof. Here, probably, and in the hall stood many of the dedicatory bronze statues of which the bases were found buried in a large pit. The whole of the space east of the hall and court was occupied by a series of chambers of considerably earlier date, with walls much more regularly built of carefully-prepared stones of moderate size, generally laid without mortar. Owing to the curious angle at which the Romans set the south stoa to the earlier buildings, the southernmost chamber is of an irregular form. The central chamber is the most perfect. All the walls are of early date, though the south wall has been partly rebuilt in Roman times. Remains of a late stone floor are interesting as giving the probable floor level. Under it, besides fragments of a Cypriote and other tablets, were found a very fine bronze gilt pin and a crystal cylinder belonging to a sceptre. In default of direct evidence as to the position of doorways, the difference of floor level shows that there can have been no access to this chamber on the north side. The main entrance was probably on the east. North of the central chamber is a broad passage or chamber, with no wall to east or west. This may have formed a great entrance for special occasions, and might thus be identified with the central feature represented on the Cypriote coins as giving a view from the open court. Two large bases for piers actually exist at the east end of the passage where piers occur on the coins. The west end was probably open. The chambers north and south correspond to the lower buildings on the coin with the court-yard extending in front of them. The chambers were probably connected with the administration of the temple, or formed residences for the priests. Finally, along the north side of the open court and overlapping part of the chambers is the north stoa, of smaller dimensions than the south stoa and with no columns in it. The floor is mosaic, but much coarser than that in the south stoa. The walls are partly Roman, partly of earlier date. Outside this stoa, which apparently formed the north boundary of the temple site, occur detached fragments of walls and small courts of Roman date, belonging, no doubt, to residences or offices for the priests or attendants of the temple.

A brief account must now be given of the antiquities discovered at Kuklia and elsewhere. On the site of the temple itself the most numerous and important finds were the inscriptions, amounting to about 150. Three or four, more or less fragmentary, were in the Cypriote syllabary. Two marble tablets call for especial mention, one containing a letter from Antiochus to Ptolemy Alexander; the other the list of contributors to the Elaiochristien, doubtless a feast connected with the ceremony of anointing the sacred cone. Another tablet bears an elegiac inscription recording that at the suggestion of King Nikokles the town was fortified; Nikokles conspired with Antigonus against Ptolemy in 310, B. C. But by far the greatest number of inscriptions were on the pedestals of statues dedicated in the temple in Ptolemaic times. The titles, both of the corporate bodies that dedicated them and of the officials in whose honor they were set up, throw much light upon the constitution of Cyprus during that period. Many of these bodies seem to have been military colonies established in the island. The officials usually bear the title *suggenes tou basileos*, with commonly the addition *strategos*. The offices of Admiral or high priest are sometimes associated with that of Military Governor. Several other officials of the Ptolemaic service are mentioned, *e. g.*, *tropheus basileos*, *arkisomatophulax*, an officer described as of the great library at Alexandria, and a mysterious official called the *arkedeatros*, of whom we hear nothing more. Other antiquities were hardly so numerous as might have been expected, but were still of considerable importance. Naturally, on this site there were found several rude images of Aphrodite of primitive form, but not a large number of the Cypriote statues and statuettes which have occurred on other temple sites in Cyprus. On the other hand, there have been found some important examples of purely Greek work — a small marble head, of later archaic style, about the beginning of the fifth century; and, above all, a marble head of a boy, about life size, which may, perhaps, be known in the future as the Eros of Paphos. This is of the finest Greek work and in perfect condition. Various heads and other fragments were found; but, perhaps, second in importance, comes a very richly-worked gold hairpin, the top of which is adorned with four goats' heads and above them four doves. The whole is a beautiful specimen of goldsmith's work. The bulk of the tombs examined in the neighborhood of Paphos had been rifled in ancient times, and even what was left was later than the date of the tombs. The pottery found in the few tombs undisturbed could not be assigned to a remoter period than the seventh or eight century, B. C. With this, however, were sometimes found vases of unmistakable Mycenæ type, seeming to show that the very remote epoch commonly assigned to these vases is to some extent erroneous. In later tombs a considerable number of glass vessels was found, some of them remarkable for their shape or coloring. On the whole, however, Kuklia is not a tomb site — probably because its ancient fame and wealth have in all periods attracted riflers who have left but little for the gleaners of to-day. The chief result, then, of the first season's work of the Cyprus Exploration fund has been the plan of the great Temple of Paphos, built according to Phœnician traditions, and so adding to our most scanty knowledge of the Phœnician temple, as famous in the ancient world, and as often mentioned in literature, as any known to or built by the Greeks. Since the completion of active work Mr. Hogarth has been engaged in a careful archæological survey of the island, and his report will help to guide the committee in future operations. In the meantime a site has already been decided upon for next season's work, which is confidently expected to yield a rich harvest of antiquities. — *London Times.*

It is reported that settlement has occurred in the piers supporting the north staircase, in the Capitol at Albany, owing to false bearing on the found..tion, and that they have been strengthened by putting iron-beams under them.

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THE GAMBETTA MONUMENT, PARIS.

LE MONUMENT DE GAMBETTA, PLACE DU CARROUSEL, [illegible]

THE competition for the monument of Gambetta was opened in 1884. As the result of the first competition, M. Boileau, *fils*, architect, and M. Aube, sculptor, were admitted to the second competition, and were successful over the other competitors. It is the work of these two artists that was inaugurated on the 14th of July. M. Boileau presented in competition four designs for different sites, one on the axis of the Avenue of the Republique prolonged, near the Cemetery of Père LaChaise; the second, before the Chambe of Deputies, fronting the Place de la Concorde; the third, in the Place Medicis, fronting the Luxembourg and the Pantheon; and the fourth, on the Boulevard de Belleville. The design adopted was finally placed on the Place du Carrousel, backing upon the small garden of the Louvre and facing the Arc de Triomphe. The monument is in form a pyramidal pilaster. On each side of the base are two seated figures in bronze, Truth, holding a mirror in her hand, and Force clad in the hide of a Classic lion and with fasces in hand, replacing the traditional hammer; that is to say, force growing out of union in place of brute force. Lower, seated in the same way, are two naked infants holding medallions, upon which are inscriptions. The principal group is cut in the block of the monument, near the base of the pilasters. Gambetta is represented standing, his arm outstretched; at his feet combatants, whose courage he reenforces, and flitting somewhat above him and bearing a flag, the allegorical figure of the La Patrie. Above the group are engraved these words, pronounced in November, 1870:

" Français, élevez vos âmes et vos resolutions à la hauteur des " périls qui fondent sur la patrie. Il dépend encore de nous de " montrer à l'univers ce qu'est un grand peuple qui ne veut pas périr et " dont le courage s'exalte au sein même des catastrophes."

The lateral faces, simpler in design, are only decorated by allegorical figures on the sub-basement; at the right, Truth, at the left, Force. The faces of the pilasters are covered with inscriptions recalling the chief points of his principal orations. Force underlines the speech at Cherbourg in August, 1880, and Truth the advice to the young men of the schools in April 19, 1870. The rear façade, upon the square, is ornamented at the base of the pyramid by a marble flag with an inscription surmounted by a trophy in high relief; in the centre of this trophy are a roll of manuscript and a crown, on the right a book, and on the left a shield bearing an inscription; finally, a crowing cock, emblem of patriotic vigilance, the fasces of the Union, arms and oak branches.

This bit of work is good and deserves attention. Before the tablet, which bears the inscription, are two seated infants holding one another by the hand, one personifying Labor, and the other Military Art. Finally, above the trophy, is engraved a fragment from the speech at Grenoble, September 26, 1872. The monument is finished by an entablature supported by a decorative capital with four volutes at the angles. Upon the front, between the volutes, is a shield with the letters " R. F." the fasces and a crown of ivy. Upon the lateral and rear front, above garlands which unite the volutes, are flags bearing the inscriptions "Liberty," "Equality" and "Fraternity," with proper emblems. Finally, above and crowning the structure is a figure of Democracy borne on a winged lion, which places its two forepaws upon a stone socle.

In this monument M. Boileau has put in execution his principles concerning the presentation of decorative figures on the stone itself without plinths. "I have always understood in this way," said he, in his monograph, "for figures of this kind I consider the employment of a plinth, puerile as it may appear at first sight, as a certain sign of weakness of decorative perception. In a monument, a statue of a hero can be presented at a particular place made for it, isolated upon a pedestal which bears it alone. It can be conceived as an entirety existing by itself, having its value complete to the exclusion of any pedestal whatever upon which it may be placed; but if the pedestal is decorated with accessory figures, why should we wish that these in their turn should be treated like heroes? With such a scheme there could be made from a mass of statuary a perfect exhibition of works of art upon an *etagère*. A perfect whole will never be made at a single stroke." This theory is ingenious and is not wanting in truth, and his application of it in the composition of the monument of Gambetta is very ably developed. The crowning piece, particularly, is superb; the movement of the winged lion is impressive in its truthfulness. The theory of M. Boileau in this morsel is fully demonstrated, but it is not proved that it must be absolute. It could even be pointed out to M. Boileau that in his competitive design for his monument at Versailles — the monument of the Constituent Assembly — he made a most unfortunate application of his theory. Upon steps of granite at the foot of the pedestal supporting the column which formed the monument, he placed, flat upon the stone, two bronze statues of Mirabeau and Bailly, who had an air of being two personages entirely independent of the monument, like two statuettes " placed upon an *etagère*," and not in any manner forming " a whole formed at a single stroke."

This criticism cannot be applied to the monument of Gambetta, which is a good composition and a good whole. Perhaps fault might be found, that the seated figures assume too much importance, and that the details of the capital of the crown are a little meagre. This lacks projection, and the volutes are very small. As to the principal group, it is of a fine movement. M. Boileau, in his monograph of the monument — a very interesting work, in which we only regret that we do not find a little more modesty — compares it to the group by Rude on the Arc de Triomphe. This is evidently an exaggeration; but, really, it is a fine bit of sculpture and full of movement. The allegorical figure of La Patrie has a little too much projection, and seems about to fall upon the principal figure. The whole monument is carefully executed, the inscriptions are well engraved, the lines in the upper part of the monument being large and diminishing in proportion as they descend, so that they may be easily read.

In short, the monument of Gambetta brings to the Place du Carrousel an important decorative feature. While new, it will be very fine. Time alone will show whether the employment of bronze in the construction, exposed to the changes of the season, is prudent, and whether the stone will not soon be covered with black and dirty stains, such as are unfortunately seen on the Grand Opera House.

Finally, this is the total cost of the work: Masonry, carpentry and metalwork cost 141,500 francs; statuary, 951,905 francs; ornamental sculpture, 28,500 francs; marble and inscriptions, 6,500 francs; commissions, 18,000 francs; models and casts, 3,595 francs; total, 350,-000 francs.

COMMUNICATIONS

THE PRESENT PRACTICE OF SLOW-BURNING CONSTRUCTION.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In reply to the queries and suggestions of Mr. Atkinson in your October 13 issue, it seems to me that, perhaps, more is being done in the interests of good construction and protection from fire, than would seem to be the case, in view of the great mass of reckless and unscientific building always in progress about us.

The higher cost of good construction over that which is flimsy and dangerous — like that of most other good things — is, admittedly, a most serious drawback in the progress of the movement for better buildings, and where insurance can be so easily and cheaply obtained, owners are discouraged in investing money for their own security against fire, when they can throw the risk upon the insurance companies and save considerably in first cost. Still, there are owners who are willing to listen to advice for better construction, and follow it.

In my own practice I have been able to carry out several pieces of construction, recently, of an improved type, and the owners' appreciation, seem to show that in some instances, at least, a wish for better building is developing. The Chadwick Lead Works, on High Street (Fort Hill Square) in Boston, is a six-story building, covering about six thousand feet of land, and having three street frontages. The construction is almost entirely such as would satisfy the insurance inspectors of the mills.

All floors are of "mill-construction." The roof is four inches thick and without concealed spaces; none of the walls are furred; there are no wooden cornices nor cornice furring. Although the

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floors were to be loaded with lead, in its various forms, each floor-beam, girder and column was calculated for its load. After a section of floor was put on, it was experimentally weighted with a known excessive load of bricks which remained in position a week, the deflection noted, and on removal, no permanent set discovered. Such a floor is entirely practical for heavy warehouse purposes.

A building for the Otis heirs, on Otis wharf, Boston, has a similar construction, and is heavily loaded.

The Boston Terra-Cotta Company's building, on Federal Street, I built in the same way, and what would have been a disastrous fire in a building of ordinary construction (a fire among a lot of dry wood patterns on the third floor) was extinguished after it had got well underway, with a minimum damage to the building.

The Massachusetts Charitable Mechanics' Association building, on Huntington Avenue, is of mill-construction, so far as the managers would consent to its use. The system was less well-known then, and divided counsels permitted my carrying out but a portion of the building in "slow burning" construction.

The Lincoln Library, a gift to the town by Geo. Grosvenor Tarbell, has ceilings wire-lathed, close to underside of heavy planking, with timbers in sight. Vaulted outer walls plastered directly on the brick. Roof of plank on widely-spaced heavy rafters, and as far as possible not a concealed space in the building. A stand-pipe and hose are provided for basement and first floor, and although, of course, not fireproof, its destruction by fire would be almost an impossibility.

The building for the School for the Feeble-Minded, at Waltham, is constructing with stone walls, furred with porous terra-cotta. Partitions, brick or 4″ porous terra-cotta; floors, mill-construction, 3″ plank; roof, 3½″ of wood; kitchen and laundry floors asphalted on corrugated iron.

The succeeding buildings are to be of similar construction.

In several dwelling-houses I have found a mill-floor for the ceiling of the cellar an excellent precaution both against fire and vermin.

By using a roof of four inches of wood, in the Savannah Cotton Exchange, the directors were enabled not only to decrease their fire risk, but to obtain a very handsome rental for a series of offices in the attic story, over the Exchange Hall. Offices in this position, under the roof, were considered as absolutely impracticable by residents of Savannah, on account of the excessive heat which had always penetrated a 1″ board roof, a ventilated air-space and a plastered ceiling below. I was permitted to build the offices, however, and put four inches of wood between the tin roof and the occupants' heads beneath.

The result has been a success. The first of July, 1888, I found only a difference of one degree in temperature between the street floor and the upper one — and that one degree in favor of the upper rooms!

A private house in Savannah with 3″ of wood for its roof, is much appreciated by the occupants of the pleasantest rooms in the house — those in the upper story.

The foregoing are some of the instances which occur to me, of the use of mill-framing and slow-burning construction in my practice, and other architects have, doubtless, been equally active.

"Fireproof" construction at the present prices of iron and terra-cotta is practically prohibitive in most cases, and we must develop as far as may be "slow-burning" methods. The insurance companies can immensely aid us in the good work by a generous discrimination of rates in favor of improved methods of construction.

WM. GIBBONS PRESTON.

EYE-BROW DORMERS.

CEREDO, W. VA., October 19, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs, — I desire to obtain some information in regard to manner of slating, as practised by slaters in and about Boston, for "*eye-brow*" *dormers* similar to those shown by Gelatine print of "Crane Library," Quincy, Mass., issued with No. 392, *American Architect*, June 30, 1883. I believe this style of dormer was first introduced in your vicinity, and presume by this time your slaters have demonstrated the best and neatest way of covering them with slate. I have enquired of slaters in this vicinity, and some from Cincinnati and Columbus, at work upon buildings under my supervision, and they all admit they have never covered any, but suggest various ways in which they think it might be done, but I have little faith in securing an effective job by the methods proposed by them. Believing that I can get the necessary information from your office, I make the application with request that you reply by mail as soon as convenient, informing me of any charge attending same and I will remit.

Very respectfully, S. FLOYD HOARD.

[MOST of the "eye-brow" dormers in this neighborhood are covered either with shingles or tiles, either of which are more tractable than slate. Whatever is used, to cover them as they ought to be done, the curves are made as gentle as possible, and the tiles, slates or shingles carried over without any break in the courses, just as if the roof had been slated in the ordinary way, and then bulged slightly upward. Roofers are generally disposed to make the curves much too sharp, so that slate will not lay well, and metal is needed in the valleys, which spoils the appearance of the whole affair. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS.

THE TOMB OF ALEXANDER THE GREAT. — According to a Berlin correspondent news, has been received from Egypt to the effect that the tomb of Alexander the Great, which Dr. Schliemann sought in vain last winter, has now been discovered in Alexandria. The coffin is of marble, and is covered with beautiful decorations. Its breadth is about three feet and a half and its height three feet. The skull of a man was found in it. The coffin was found in a brick vault, about twenty feet high, covered by about eight feet of earth. The keeper of the museum at Boulak is going shortly to make a thorough examination of the tomb. — *Pall Mall Gazette*.

LONDON ROOKERIES AND THEIR ENLIGHTENED OWNER. — There seems to be a prospect of the scandal caused by "Lord Salisbury's rookeries" coming to an end at last, and a very appropriate end, too. The dilapidated, rickety, unsanitary tenements in Cecil Court have at last reached such a stage of decay that they can hold together no longer. The roof of one of them collapsed last week. At a meeting of St. Martin's Vestry, the surveyor stated that he had obtained the necessary certificate that it was dangerous to pass through the court, and accordingly the traffic had been stopped, and policemen had been placed on duty to keep people out of danger. When a few more formalities have been gone through, what is left of the wretched structures will be demolished by the Board of Works. A pretty state of things, this, truly, on the estate of the prime minister of England, and a leading authority on the housing of the poor! — *London Truth*.

TRADE SURVEYS.

A VERY large amount of work of an engineering character is being placed in the machine shops, foundry and machine-making establishments of the country. This branch of industry is assuming a magnitude that is surprising even to those whose business it is to keep run of extensions and improvements. The expenditures for machinery-making facilities are quietly made in all parts of the United States and their aggregate is not even suspected, till something like a rough calculation is made. The cost of freight from far points in the far East to the far South and West, is such an item that new manufacturing establishments have been forced into existence to furnish the newer sections of the country where fuel, raw material, cheaper labor, lower freight rates and nearness to consumers all act as incentives to the establishment of new works. The organization of iron works, mills, furnaces, the establishment of pipe works, terra-cotta works and general machinery establishments, bridge works, electrical supplies, hardware factories, carriage works, nail factories and a hundred and one industries in localities where heretofore dependence for supplies was placed upon the older cities is one of the encouraging features of the past year. This decentralization of industries is a necessity for many reasons. The departure of these manufacturing establishments, starting up in these new sections of the country is one which will grow in magnitude year after year. It is to be noted that the development of coal mines in the West and South is responsible for a large amount of this enterprise and within the past two years upwards of 100 mining companies have established themselves successfully in localities where a few years ago the existence of coal was hardly supposed. Excellent deposits of fine manufacturing and steam-raising coals are found to be at moderate depths below the surface. It is found by use to be adapted to domestic, manufacturing, railroad and all general purposes. Eastern promoters of industrial enterprises throughout these new sections have all been giving a very good account of their industries and attach much of their success to cheap fuel and some of it to more equitable freight rates that are now prevalent. In addition to this, discovery is made, that labor in these far Western towns is more contented than in the East. One explanation of this contentment is shown to be that the wage-workers have more houseroom, more pure air, greater liberty and are less subjected to vexing agitations which find rise from overcrowded surroundings. They are satisfied to work along quietly with such rates of pay as their employers find it possible to establish. Besides this there is a great deal of quiet railroad building going on in the West developing localities that in the far East were never heard of. The effect of all this is to create a demand for every kind of machinery turned out. Accordingly, shop labor is in good demand.

All of our locomotive works are booking orders from week to week for more and larger engines. The variety of engine work demanded was never so great. Machinery is wanted for well-boring purposes throughout the arid regions of the West. Engines are in demand, and there is a demand also for street-paving material, to say nothing of the endless demand for electrical supplies and equipments. A vast amount of sewerage work was undertaken this year, and will be completed next. The Western and Southern people are looking particularly after their sanitary interests. Large water-supplies are being established all through the West; large irrigating companies are being established, and the demand from these sources is being reflected in the increased activity for larger machinery and in our larger machinery establishments all the way from St. Louis to Boston. In a few years what we have heretofore regarded as a purely agricultural region, and stock-raising region of comparatively little value at that, will become a thickly populated region and fertile portion of the United States that will attract capital with more force than it is even now doing. Capitalists throughout our Eastern States are offered excellent opportunities for heavy and permanent investments in the region of country between Montana and Northern Mexico. The capitalists have found in the first place that there is an abundance of coal there, and some recent developments have shown that the mineral resources of that region have been very little understood, much as we imagined we knew. Within the past thirty days the makers of mining machinery in Chicago, Philadelphia and at other smaller towns East have booked the heaviest orders that they have ever had for machinery to be delivered during the first half of next year. It is in these newer sections of country that balancing effects to maintain industrial ctivity are to be found. Reactionary influences which might otherwise develop themselves throughout the East will be nullified by the extending demands and opportunities of markets which railroad-construction and individual enterprise is opening up away to the West of us. The trade conditions of the country have not changed materially during the past month. A very heavy distribution is in progress. Jobbers throughout all our Eastern States have a good account of business prospects. In leather goods there is an advancing tendency. In lumber, prices are firm. In dry goods, and textile goods of all kinds, the distribution is keeping stocks restricted, and manufacturers are sailing close up to market demands.

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No. 671
American Architect and Building News, Nov. 3 1888
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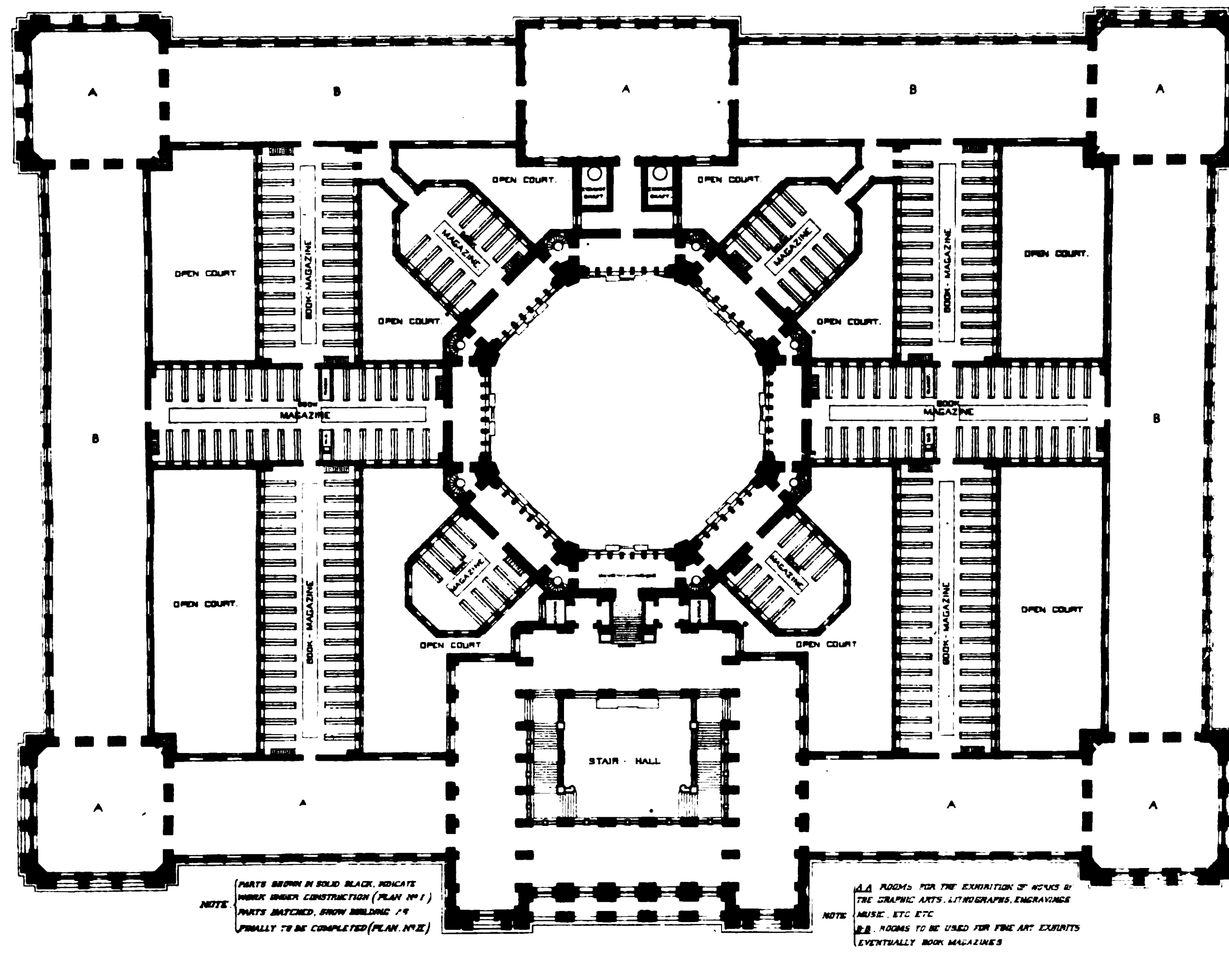
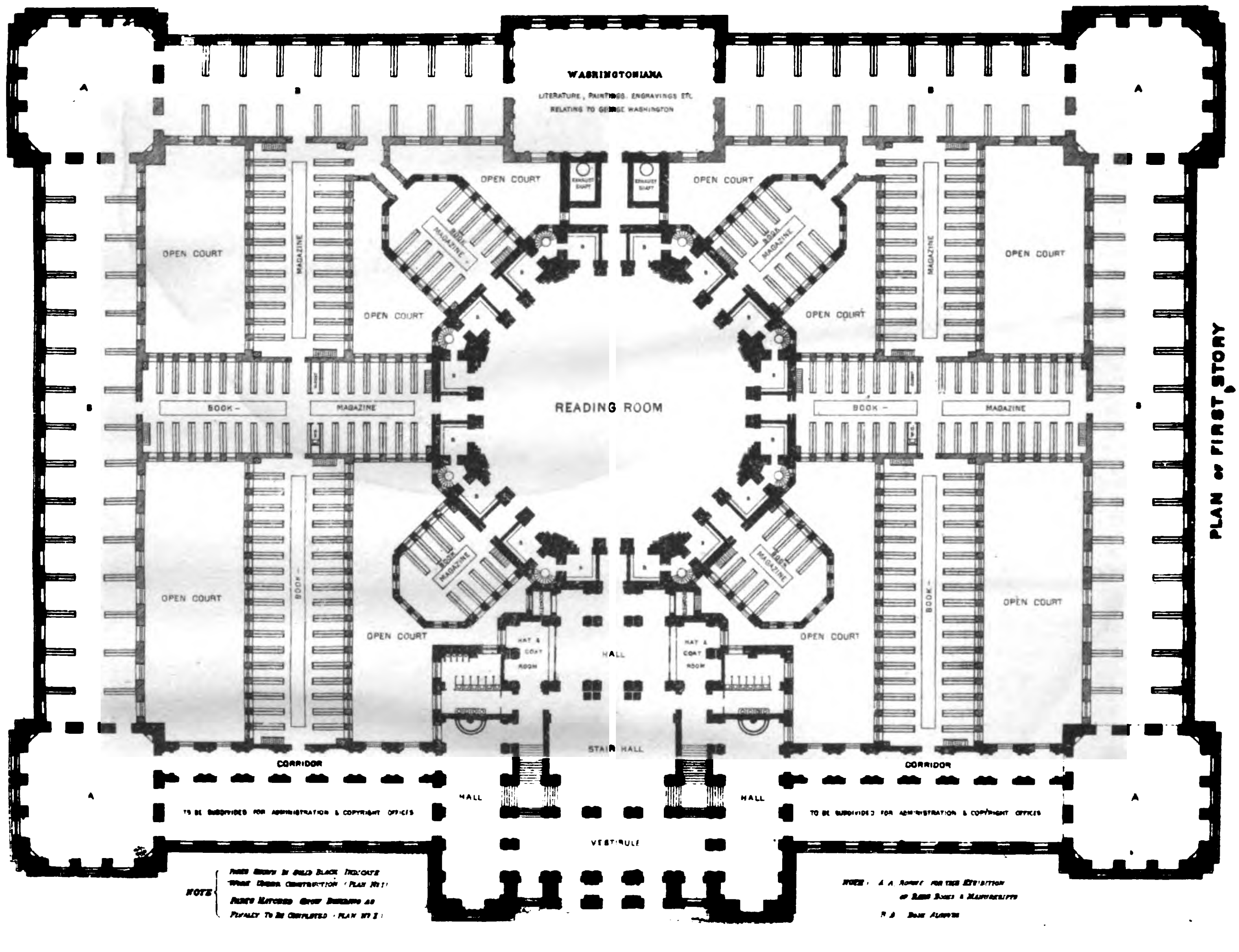


PLAN OF SECOND STORY



PLAN OF FIRST STORY

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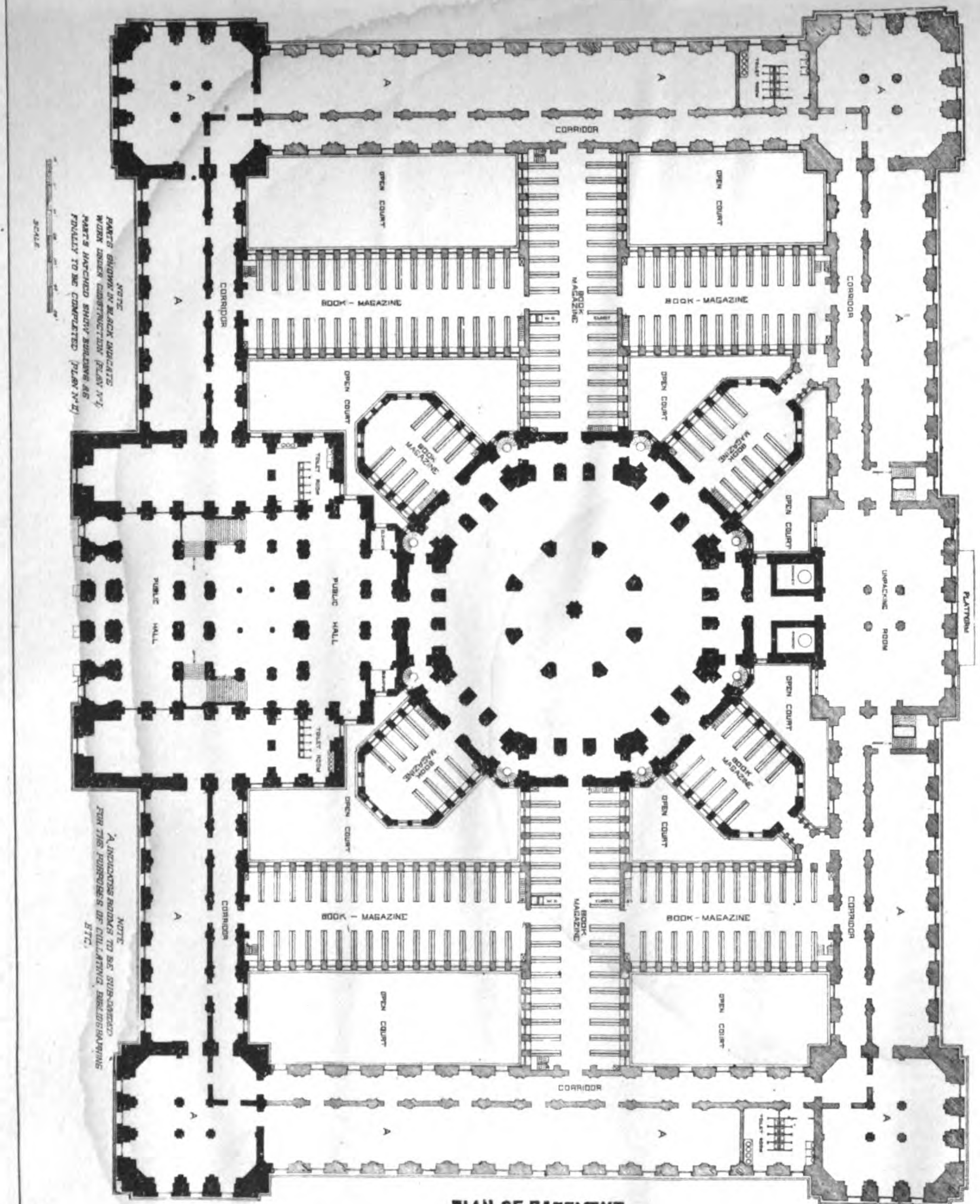
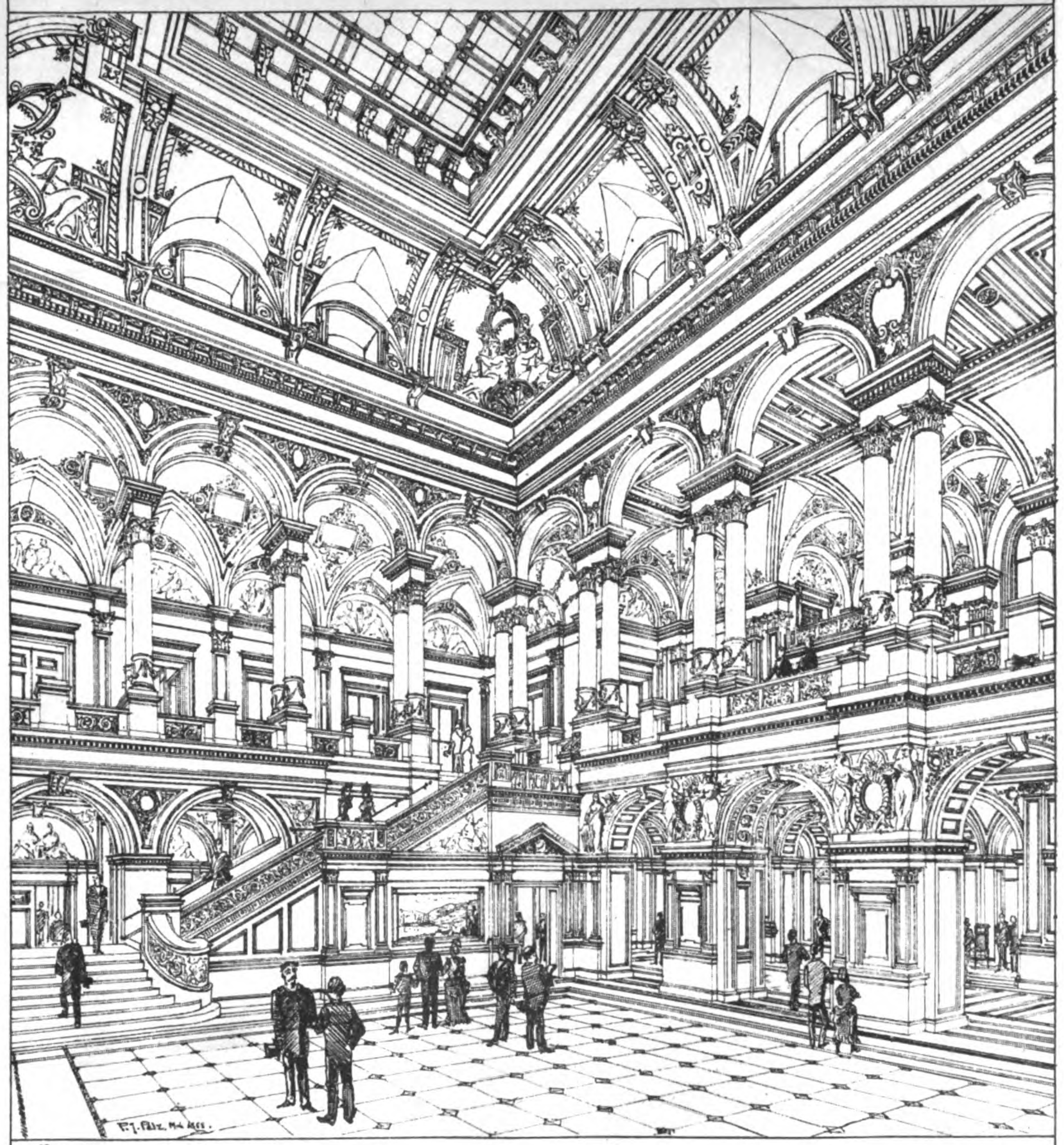


PLAN OF BASEMENT



Smithmeyer & Pelz architects

VIEW OF THE STAIR HALL

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CONGRESSIONAL LIBRARY BUILDING

Smithmeyer & Pelz Architects. Sept. 1888.

VIEW OF ONE OF THE CORRIDORS OF FIRST STORY

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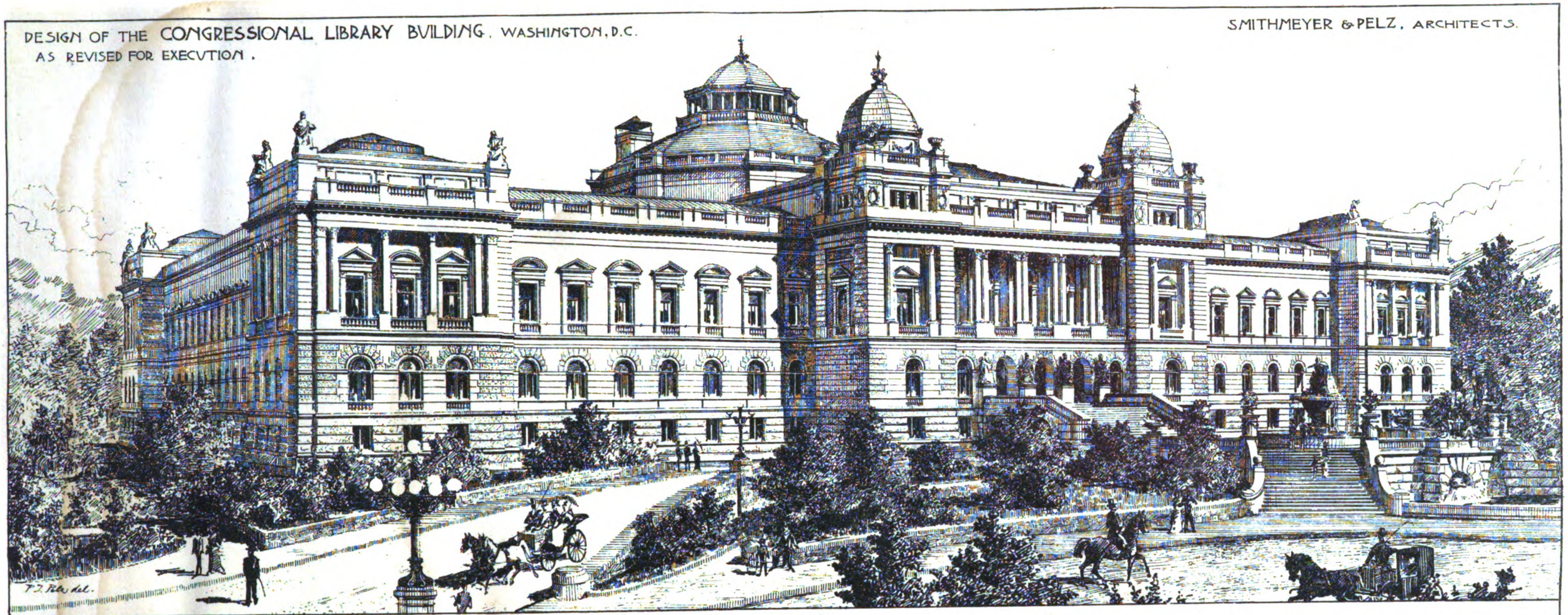

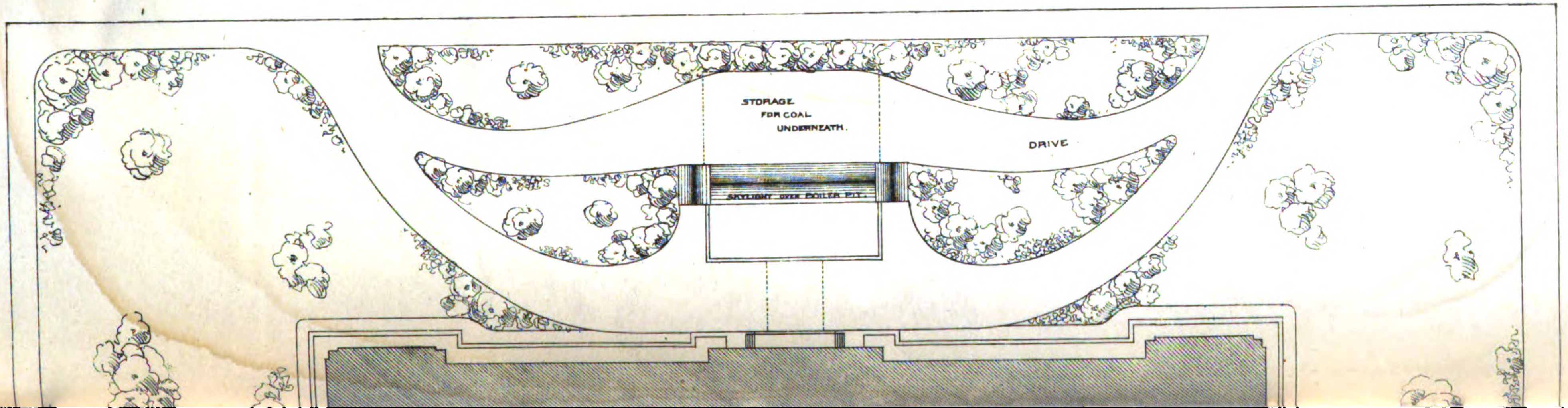

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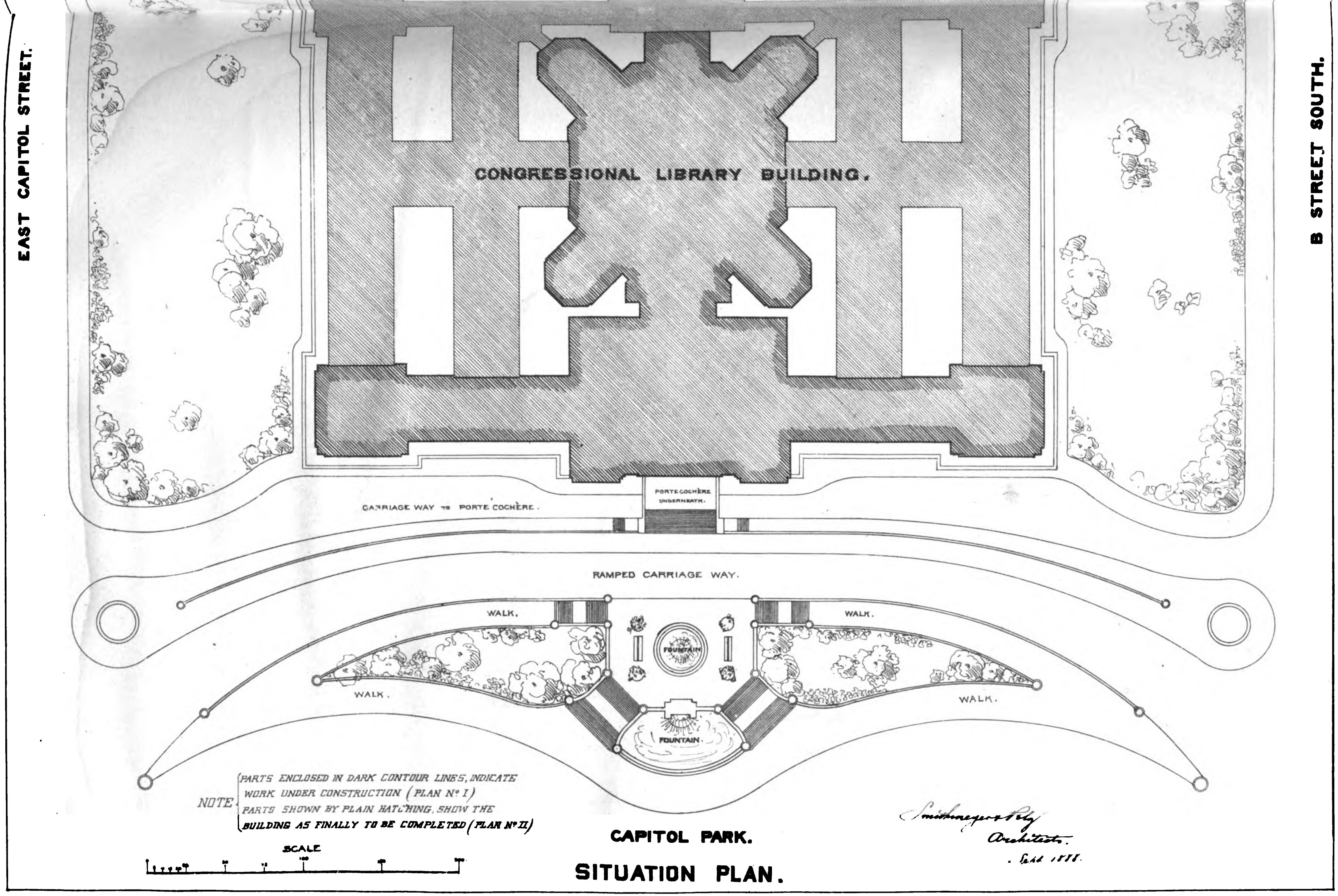

CAPITOL PARK.

SITUATION PLAN.

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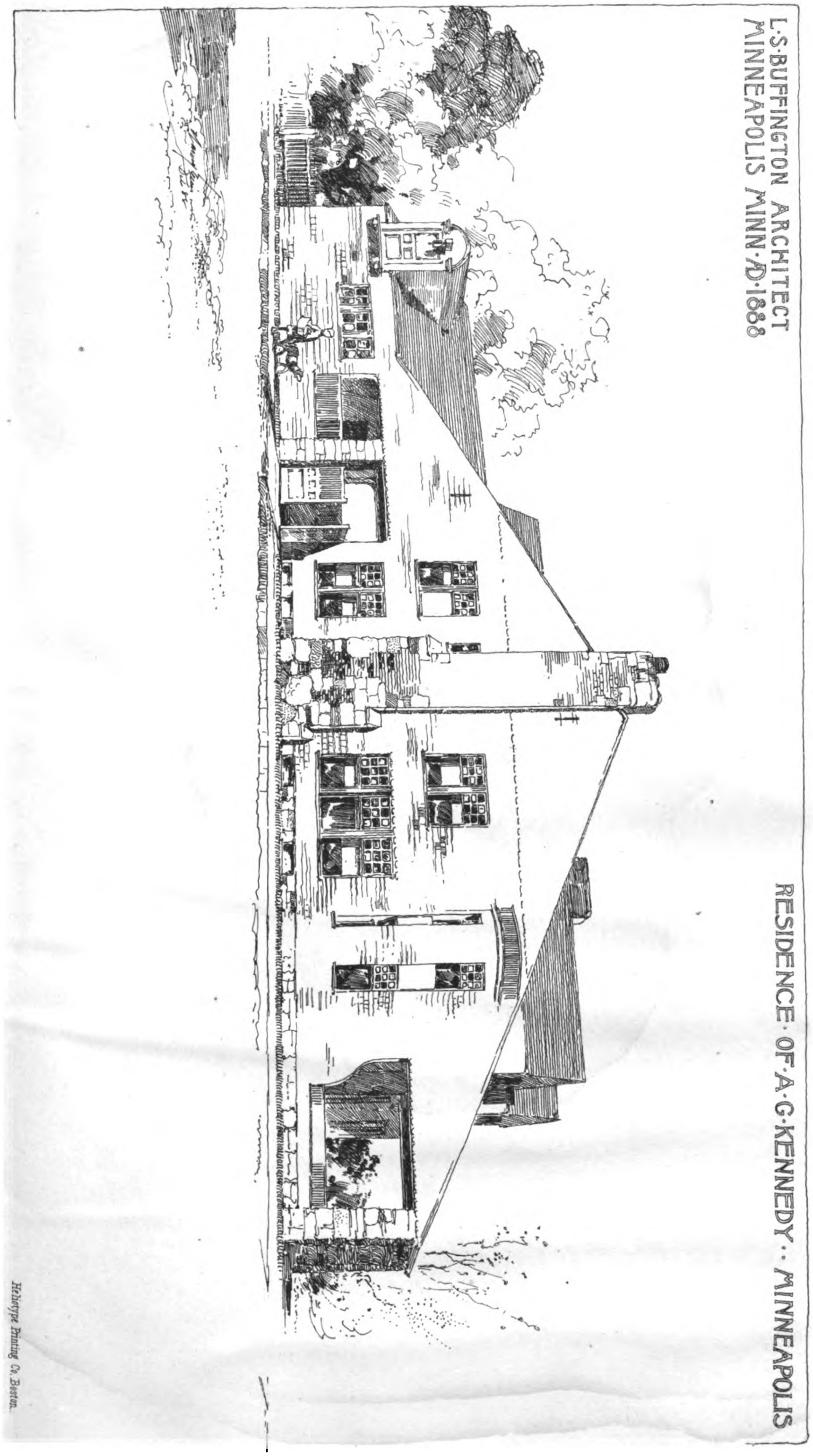

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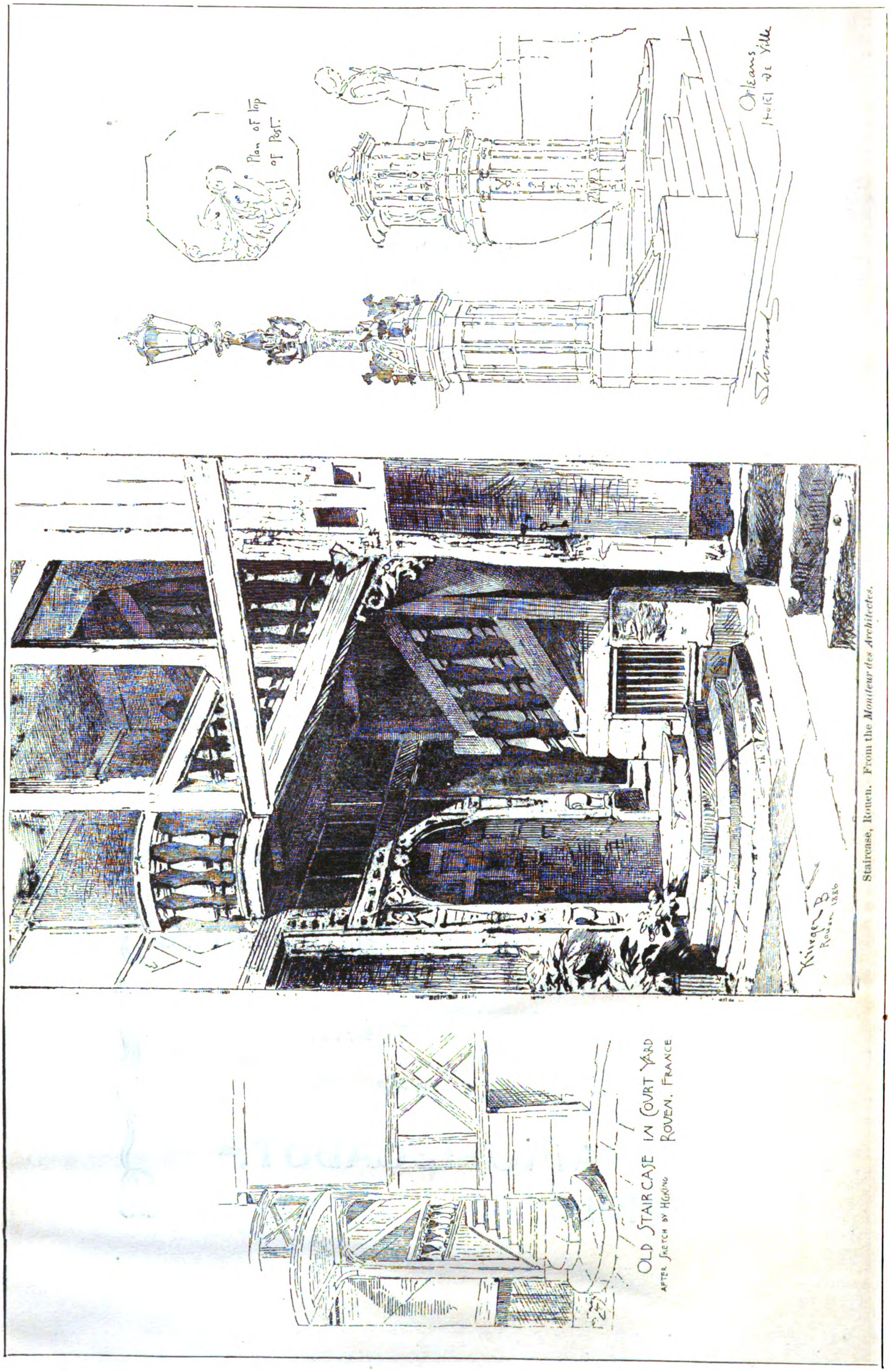

Staircase, Rouen. From the *Moniteur des Architectes.*

STAIRS.

The American Architect and Building News.

Vol. XXIV. Copyright, 1888, by Ticknor & Company, Boston, Mass. No. 672.

November 10, 1888.

Entered at the Post-Office at Boston as second-class matter.

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THE *British Architect*, in commenting upon what we had to say about the burdensome and unreasonable load of responsibility placed on architects in this country by the curious condition of the law, and the unwillingness of the profession to insist upon the employment of clerks-of-works, thinks it very singular that the American architects should allow such a condition of things to continue. It says, what we all know, that to circumvent the rascality of a dishonest contractor, nothing but the constant supervision of a clerk-of-works is of the least avail, but it considers that it is unjust to the architect, and unfavorable to the interest of his client, to expect the architect either to furnish such supervision himself, or to pay some one else for furnishing it. "In England," it says, "it is difficult to imagine the provision of an efficient clerk-of-works as being a luxury to be provided at the expense of the architect;" and it adds that "No English architects, with any practice at all, would ever dream of trying to do without a clerk-of-works, nor would they ever dream of paying his salary out of their own pocket," and counsels American architects to unite in putting an end at once to "such an absurd practice." We are glad to know that the recent Convention of the American Institute of Architects took up this matter, and adopted what may be called a resolution preliminary to beginning to do something about it; and we hope that the Convention of the Western Association, to be held this month, will take a long step further.

THERE would be, we think, very little difficulty in getting the new system generally adopted. In fact, there are symptoms that the public is ready to meet us more than half-way. Most men are tolerably reasonable in such matters, and the conviction that the anxious, harassed architect cannot, and ought not, to be expected to give a building the daily supervision necessary to secure the owner against the contractors' tricks is quite widely spread among owners, in connection, moreover, with the corresponding conviction, that nothing short of daily supervision is required for the purpose, and that as architects cannot fairly be expected to furnish or pay for it, the owner, in his own interest, should do so. If our architects would give up the struggle to please the greedy persons who think that a professional man cannot do too much for them, or be paid too little, and acknowledge that they cannot do justice either to themselves or their clients under the present system, we think the change which we all so much desire would be easily and quickly accomplished, with great benefit to all parties. The owners would certainly profit, by the security they would gain against the hidden vices of construction which ultimately cause them so much loss; the architects would gain, what they all need so much, leisure to study their designs and think over their plans, instead of spending their days in climbing ladders and inspecting caulked joints, and last, but not least, a very extensive field of employment would be opened to the young architects and assistants who must depend now only on office-work. In Europe nearly all young architects get their most valuable experience as clerks-of-works for some master of the art. They are well paid, are in constant communication with their principal, and enjoy the opportunity, which they can get in no other way, of seeing every consecutive step in the process of building, from the laying of the footings to the setting of the vane.

IN the discussion about clerks-of-works, it will be well for American architects to remember that there are several varieties of these functionaries. The best, of course, are young architects and assistants, who, if they have any talent, delight in the occupation of seeing a good design executed in brick and stone, and take pleasure in looking out that everything is carried along smoothly. Next to these come the professional clerks-of-works, who have a good deal of practical knowledge, and are often very faithful and useful, but are less to be depended upon than men of higher theoretical attainments in cases where an unusual construction, or an unfamiliar material, is to be employed. Under such circumstances the educated man interests himself to study from books, or other examples, the conditions necessary to success, and consults, as in honor bound, his principal, to make sure that the information he has acquired meets with the latter's approval, and to gain such additional knowledge as he can; while the mere practical man is apt to be afraid of showing his ignorance, and goes along blindly, often changing the design, without orders, to suit his own narrow experience, or involving the architect in some other way in annoyance and loss. After the ignorant practical man, and a long way below him in usefulness, comes the conceited person, who is sometimes a practical man and sometimes a theorist, but is equally worthless in either case. We have seen some of these gentry in various positions here, but the most conspicuous specimen yet described seems to have been the individual who acted as clerk-of-works for Mr. E. R. Robson, the architect to the London School Board, whose controversy with the Board in regard to certain improperly executed contract work, for which it sought to hold him responsible, is fresh in our readers' minds. As an illustration of the depth of insolence, inefficiency, and unfaithfulness to which this sort of assistant can descend, we know of nothing more striking than the sworn testimony of the person in question. It is hardly necessary to say that he, having been, by his own story, the one to whose negligence and incapacity the imperfect workmanship complained of was chiefly due, appeared as the principal witness against Mr. Robson, whose intentions he was hired to see properly carried out. The way in which he performed this duty can be best judged from his own words. He found, one day, as he alleges, that the plan sent from Mr. Robson's office for the school-house which he was supposed to be supervising showed a staircase in the upper story with insufficient head-room. Instead of making himself the insignificant alteration necessary to gain proper headway, or returning the plan to have the error rectified, if any existed, which the assertion of such an expert by no means proves, he sent a message to the office that there was "a mistake in the plans." He seems to have thought that Mr. Robson would immediately hurry to the spot, to bow the knee before his superior knowledge, and listen humbly to his suggestions for putting the matter straight. Unfortunately, Mr. Robson had something else to do, and sent one of his assistants to see what the trouble was. The assistant came and inquired for the plan, and asked to have the mistake pointed out to him. The lordly spirit of the clerk-of-works could not bend so far as to tell a mere subordinate what fault he found with the plan. He "did not care to furnish him with brains," to use his own expression on the witness-stand, and the assistant returned to the office without discovering any error. No further effort was made by this valuable person to have any correction made, and, when the time came, he had the staircase built as he conceived it to be shown on the plan, with such narrow head-room that people could only get through by crawling on their knees; and completed his remarkable services in regard to this portion of the

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building by trying to have Mr. Robson compelled to pay damages on account of it.

THE city of Washington furnishes just now some instructive illustrations of the advantages and disadvantages of doing civil work under military care. As we have learned from the discussions about the Congressional Library, there is an idea prevalent at Washington to the effect that building operations, if supervised by an army engineer, are always carried out with inconceivable economy, perfection and dispatch, and that no amount of experience or training can enable a civilian who makes architecture or engineering his profession to compete in efficiency with a West Point graduate. Acting upon this notion, the direction of the Congressional Library Building was recently wrested from the architect to whom it was awarded, and handed over to a military man, just as another work, under the charge of another military man, was completed. Now, it appears that the last-mentioned work, the construction of the Washington Aqueduct, has not reflected such brilliant renown upon its warlike superintendents as the debates in Congress on the Library would lead us to expect. Instead of masonry, the aqueduct shows in many places immense voids, while, where stonework was used, it was put in with about one-sixth the proper allowance of cement, by unskilled men, so that it is of little value, and, according to the last accounts, it is probable that the tunnel, the most important part of the aqueduct, built at an enormous cost, will be abandoned, as unfit for use, and too bad to be worth repairing. Of course, we know well enough that General Casey will prevent any such mishaps with the Library Building, but he is said by the newspapers to have made a remark in regard to it which is worth reflecting upon by those who think that architects are advantageously replaced in their own business by military men. Some reporter, in the course of his inquiries, asked General Casey whether the modified Library Building, which he is now, by direction of Congress, engaged in carrying into execution, would accommodate the books after it was done. The General replied, with soldierly promptness, that he did not know, and did not care, whether it would or not. His orders were, he said, to erect a building which should not cost more than four million dollars. These instructions were perfectly definite, and he proposed to carry them out. Nothing was said in his orders about having the building accommodate books, and it was not for him to concern himself with matters not commended to his attention.

IT would be interesting to hear what Congressmen would say to an architect who announced that he did not care whether the building he was about to erect for the Government would accommodate the service for which it was intended or not, yet there is no question that General Casey is right in his view of his duty. An architect would be bound to tell the Government, what is certainly true, that four million dollars, the present limit of the appropriation, will not cover the cost of a good and substantial building large enough to accommodate the Library of Congress, with the additions which it will very soon accumulate. Mr. Smithmeyer informed Congress of this obvious fact, and was ignominiously driven out of office in consequence, but General Casey is not asked about that point, very properly contenting himself, as a military man, with the instructions issued to him; and the effect appears to be that the United States is being rapidly endowed with a building not large enough for its purpose, incapable of alteration or increase of size without enormous expense, and thus practically useless, except as a temporary shelter for some of the public books, simply because Congress has seen fit to decree that a ten-million-dollar building shall be built for four millions, and has ordered an army officer to carry out its mandates, so as to get rid of the expostulations of an architect conscientious enough to tell the truth about their practicability.

SOME interesting explorations have been going on at Mycenæ, under the direction of the Greek Government, which took up the work at the point where Dr. Schliemann abandoned it. It has been discovered that the city is nearly surrounded by groups of tombs, cut in the rock, much like those of Egypt. Each tomb consists of a gallery, sometimes sixty or seventy feet long, excavated in the side of one of the rocky hills, from which open chambers ten or twelve feet square. These chambers contain skeletons, never less than two, and often many more. The appearance is that each chamber belonged to a family. When a member of that family died he was placed in the tomb, where slow decomposition took place, until only the bones were left. On the death and burial of a second member of the family, the remains of the first were often moved aside, to make room for the new-comer, and in many cases, after the tomb had become uncomfortably crowded, a small pit was cut in the back of the chamber, into which were piled the bones which had become detached, so as to clear the place and make it neat. Very few manufactured objects have been found in the tombs. A few necklace-beads, of rock-crystal or onyx, rudely ornamented, have been found, together with two gold rings and some bits of ivory, one piece being carved into a human head, and a few weeks ago was discovered a large vase, nearly eight inches in diameter, with one handle, all of silver, with eight human figures in gold inlaid around the top, and inlaid gold ornaments underneath. It is believed that these antiquities date from at least the twentieth century B. C., and the ornaments on them show a marked Oriental character.

THE great competition for the rebuilding of the front of Milan Cathedral has terminated in the award of the first prize, eight thousand dollars in money, to Signor Guiseppe Brentano, of Milan. The first competition, which was open to all the world, ended in the selection of fourteen plans, the authors of which were invited to take part in a second contest, and this second competition is the one which has just been decided. Out of the fourteen designs, the judges unanimously selected four, those of Beltrami and Brentano, of Milan, Nordio, of Trieste, and Deperthes, of Paris, which were then voted upon separately. One of the designs, that of M. Deperthes, showed towers, with spires, on each side of the main front portal, and the first question put to the judges was whether any plan with spires should be considered eligible to the first place. Nothwithstanding the eloquent advocacy of a Milanese member of the jury, the majority voted that no designs with towers or spires should be approved, and, M. Deperthes being thus eliminated from the race, the choice among the remaining three fell upon Signor Brentano. M. Deperthes, who himself writes to *La Semaine des Constructeurs* a fair and temperate account of the competition, says that he is not convinced by the result that a pair of towers would not improve the façade, and we are very much inclined to agree with him. Although we did not greatly fancy the towers of M. Deperthes's original design, we think that most people would say that the present front of the Cathedral is low and insignificant, apart from its ugly detail, and that a pair of well-studied spires might be made to improve it very much.

HOWEVER that may be, we can console ourselves with the thought that a very interesting competition has been decided in the most careful manner by some of the best judges in the world, and the result is sure to be satisfactory. Signor Brentano will much belie the reputation which he has gained by the competition, as one of the most distinguished of Italian architects, if the detail of his work is not beautifully designed and executed, and he has ample inspiration in Milan for success in the semi-Northern Gothic in which he must work. In reviewing the original competition, it is curious, as well as instructive, to notice the way in which the unsuccessful competitors seem generally to have erred by the adoption of some eccentric motive or detail, which has destroyed the value of a design perhaps otherwise very meritorious. For example, the plan of Hartel and Neckelmann, of Leipsic, one of the simplest and best of all in our opinion, and adorned with a pair of noble spires, is spoiled by putting a triangular porch in front of the principal door, after the fashion of that at Ratisbon, which we should not have supposed that any architect would wish to imitate. In a similar way, Mr. Brade's front, an effective piece of what we might call Genoa or Orvieto Gothic, comports poorly with the fantastic dome behind it, and the want of harmony is only made more conspicuous by the attempt made in the published drawing to conceal it by representing the building in perspective, with the dome nearly hidden behind one of the flanking towers of the façade. We might go on and point out various other illustrations of the maxim that it is the details that the architect did not think about, or got over too easily, or left until there was not time enough to study them, that generally insure defeat, but any one who has preserved the published sketches of the designs can find them for himself.

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BUILDERS' HARDWARE.[1] — XI.

DOOR–STOPS.

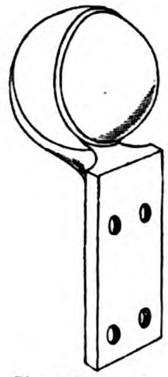

Fig. 137. Door-bumper. J. B. Shannon & Sons.

SOME form of stop is always desirable in order to keep the door from striking the finish when swung open, or breaking the plastering. The commonest form consists of a wooden knob screwed straight into the base and tipped with rubber. The variation from this is a wooden-knob, which is screwed into the floor and has the rubber-tip on the side, to be used when the door does not swing against the wall, but has to be stopped at some point. These stops are made in birch, maple, ash, oak, chestnut, cherry, walnut and mahogany and are listed at $5.00 per gross for birch to $6.50 for mahogany. They are made in two sizes, 2½ and 3 inches long; the wood is turned and a gimlet-pointed screw is firmly attached to the stop, so that it can readily be put in place by hand. The prices are the same whether the rubber tip is on the side or the end. They are also made with a rubber ring entirely encircling the knob, the list price being $12.00 per gross.

The Meriden Malleable Iron Company manufactures elastic-headed screws which are used more for furniture than for doors, but which might be desirable in some cases. They consist simply of a half-round head which is covered in upholstery of some kind and fitted with a gimlet-pointed screw. These cost from $11.00 to $17.00 per gross, list price, depending upon the material with which they are covered. J. B. Shannon & Sons, manufacture a door-bumper shown by Figure 137, which is intended to prevent jar and noise in shutting the door: it consists of a cup with a brace attached to be screwed to the face of the door; a rubber ball is pressed into the cup so that it will not fall out. A piece of rubber made fast to the jamb casing over the door, for the ball to strike against, completes the contrivance. The rubber over the door may be increased or lessened in thickness so that when the rubber ball comes in contact with it the compression will allow the door to latch. This device effectually prevents any slamming of the door. The list price is $1.00 each. The only possible objection to its use would be that the head might prevent the door from being latched properly.

DOOR–HANGERS AND ROLLERS.

The commonest form of door-rollers are those used for barn-doors. Usually a barn-door slides on rollers or sheaves which are applied to the inner face of the door and run over a metal track secured to the floor. There are many kinds of large sheaves and rollers manufactured for barn-doors, which are too simple to require any illustration. The commoner kind consists of a large wheel with a steel or metal axle. The better kind of barn-door rollers are provided with anti-friction axle bearings; that is to say, the axle of the wheel revolves in a cycle of small pins or rollers by which the friction is considerably reduced, and the wear on the bearings very materially diminished. Figure 138 is an ingenious device for a barn-door-roller, the working of which will be readily apparent from the drawing. The inner plate, *A*, is screwed directly to the door, through the openings in the wheel, *B*, which revolves on the anti-frictional bearings.

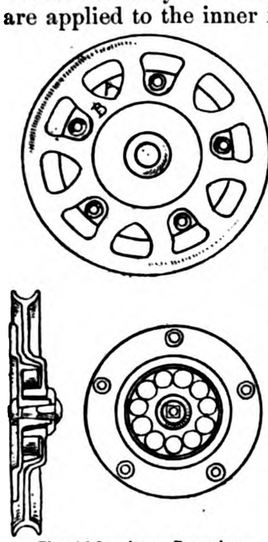

Fig. 138. Acme Barn-door Roller. Moore Mfg. Co.

Figure 139 shows a form of barn-door-rail, intended to be used with a wheel which shall rest on the flanges and not bear at all on the upright portion. In this way the wheel will clear away any collection of snow or ice by its own action and enable the door to roll easily.

The standing objection to barn-door-rollers which are applied to the bottom of the door, is that they are too easily thrown off the track by obstructions and also that the track itself is apt to get in the way and be a bother in driving over it. The greatest amount of ingenuity has been expended upon door-hangers in which the door is suspended from a track at the top. The only objection which is to be urged against this manner of arranging a sliding-door, is that in case of a violent wind the door would be forced inward. This difficulty can be in a measure obviated by the use of some form of stay-roller, such as Figure 140, which can be attached so as to prevent any lateral motion of the door. This form of stay-roller is also used for doors which slide on sheaves at the bottom, taking the place of an overhead groove.

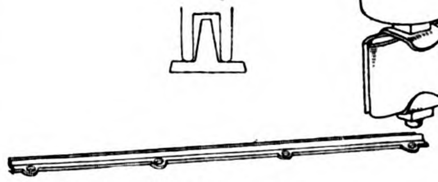

Fig. 139. Nickel Barn-door Rail. Coleman Hardware Co.

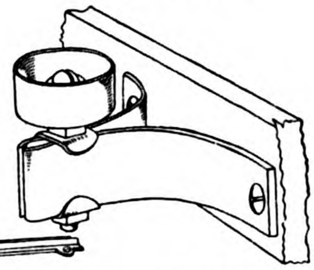

Fig. 140. Victor Stay-roller. Victor Mfg. Co.

There are really but two distinct varieties of barn-door-hangers; the first is represented by Figure 141, and consists of a single wheel running on an overhead-track and attached to a hanger which is screwed on to the inner face of the door. The same form of hanger is made to be used with an iron rail. This form is rather old but is very good and we should imagine would give little trouble. It is made with anti-friction bearings. The second variety of hanger is one in which the axle is not fixed but travels along a single bearing beam, as in the "Moody Hanger," Figure 142, which is one of the simplest of this kind. In this the axle bears on two bars, and the uprights to which the bearing bars are secured, are placed sufficiently far apart to admit of the axle having enough play for the opening of a single door. The rail and brackets are made of steel and the wheel has a steel axle.

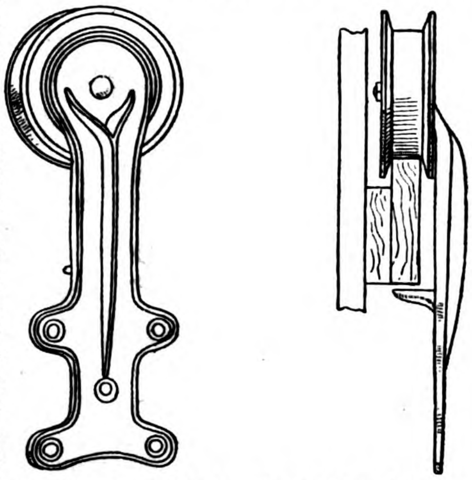

Fig. 141. Climax Barn-door Hanger. Moore Mfg. Co.

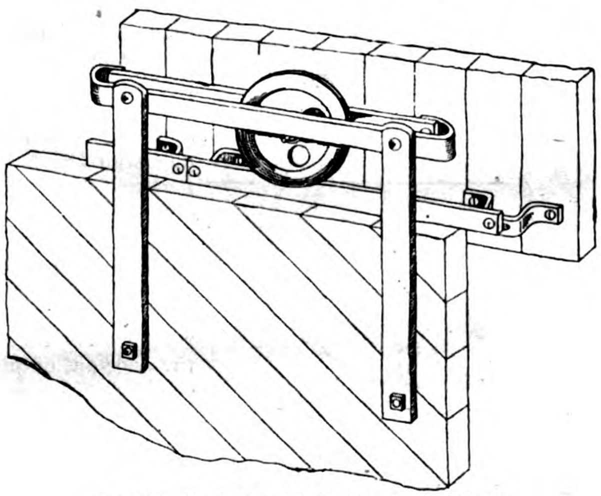

Fig. 142. Moody Barn-door Hanger. Victor Mfg. Co.

The "Victor Hanger," Figure 143, is a slight improvement over the "Moody" in that the bearing is on a single bar instead of on two; and that the wheels work on each side of a high, ridged track which prevents them from slipping off or becoming interfered with.

The "Lane Hanger," Figure 144, is very similar to the

[1] Continued from page 193, No. 670.

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"Moody" though the arrangements of the supports is somewhat different.

All of the foregoing hangers are made of wrought-iron or steel, with steel or chilled-iron bearings. Several kinds of hangers are made with malleable iron, such as the "Nickel," Figure 145, which follows the pattern of the "Moody Hanger." The "Nickel Hanger" is also made in steel, with a slightly different shape. The "Hatfield Hanger," Figure 146, also in malleable iron, is a form after the pattern of the "Lane," on which the patent seems to have run out; at any rate, a similar form is made by several of the manufacturers, and the principle embodied in the "Hatfield" and the "Moody Hangers" is the one which is usually considered to be the most satisfactory; that is to say, one in which the axle bears on two parallel plates and works in slots; indeed, this principle is applied to nearly all the most successful hangers, both for barn-doors and parlor-doors.

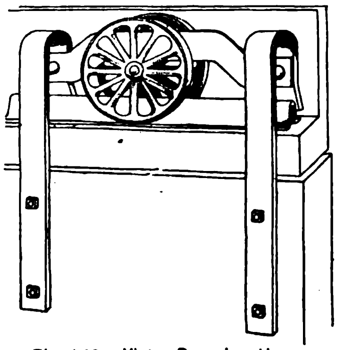

Fig. 143. Victor Barn-door Hanger. Victor Mfg. Co.

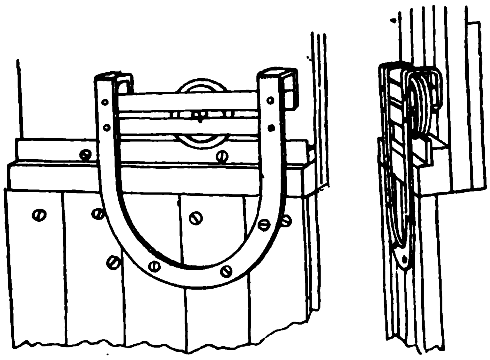

Fig. 144. Lane Barn-door Hanger. Lane Bros.

For parlor doors many builders and architects still prefer sheaves mortised into the bottom of the door. The rail, which is a necessary part of this arrangement, is admitted to be a trouble, but the rollers are so easily taken out that the rail is retained. There seems to be an idea with many people that the overhead hanger more easily gets out of order, and that it is more complicated. This is a mistake, for there is hardly a hanger in the market that will not give satisfaction if properly applied, while any one who has had experience with sheaves and rail at the bottom can testify to the trouble which will sometimes occur, with the settlement of the woodwork throwing the door out of plumb or obstructions getting on the track and throwing the wheels off. Some of the overhead hangers require more care in setting, and others have some special adjustment which must be understood; but the principle on which they all work is so simple that, to the uninitiated, there seems to be but little choice between the various kinds.

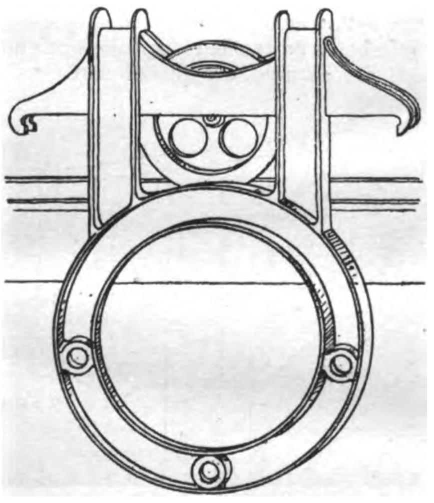

Fig. 145. Nickel Barn-door Hanger. Coleman Hardware Co.

The ordinary mortised sheave, of which Figure 147 is a type, runs on a brass rail, which is generally made with a raised section, though a form is sometimes used which is channelled instead of being raised. The former will be something to stub the foot against; the latter will collect dust. The only form of rail in the market, which presents neither of these difficulties, is the "Climax," Figure 148. This consists of a double brass track with a central strip, which is held flush with the two sides by springs inserted at intervals in the track. A special form of wheel is manufactured to go with this rail. The wheel, in passing along over the rail, presses down the central strip, forming a groove for the wheel to run in. When the door is opened, the springs force the flexible central strip up again, so that when the doorway is entirely clear the appearance is of a single brass plate perfectly flush with the floor. The list price of this rail is sixty cents per foot in brass.

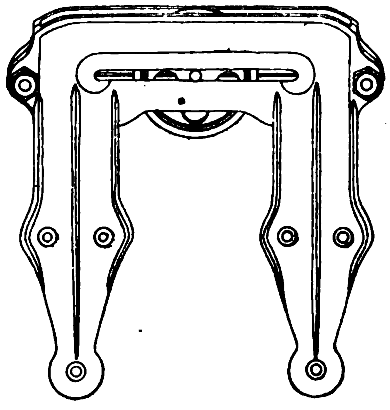

Fig. 146. Hatfield Barn-door Hanger.

Besides the common pattern of mortised sheaves, shown by Figure 147, there is another form which works more easily, made on the same principle as the "Hatfield" barn-door hanger. This is shown by Figure 149. This sheave is made in five sizes, from two-and-one-half inches to six inches in diameter of wheel and costs from $1.50 to $4 per set of four sheaves.

Parlor-door hangers are usually arranged to run on a wooden or metal track which is bolted to the side-studding. There are one or two points which should be considered in judging of any door-hanger as ordinarily applied. In most houses the studs which form one side of the sliding-door pocket are made to rest on something pretty solid, a foundation wall, or, at least, a heavy timber, while on the other side of the pocket the studs are supported on the floor-joist, and are left to settle with the shrinkage of the timbers, thus bringing about a difference in level of the two sides of the pocket. It may, then, be stated as a general rule that the best form of hanger would be that which is supported on one side only, since if any inequality of settlement takes place, it does not affect the hanger. Another consideration is, that it would be well to have the door-hangers so arranged that in case the door should not hang perfectly plumb, there would be no inequality of bearing on the axles of the wheels. It will be seen that this is perfectly possible, and that it has been considered in some of the forms of door-hangers.

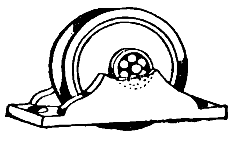

Fig. 147. Sliding-door Sheave. Russell & Erwin.

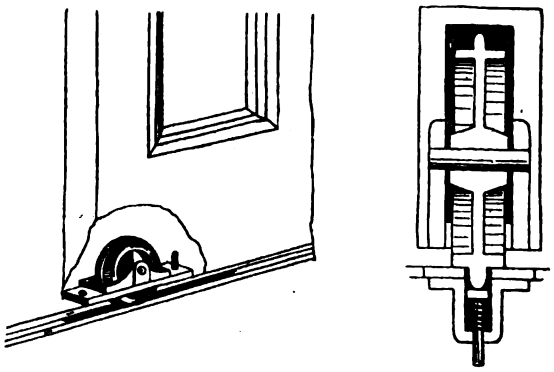

Fig. 148. Climax Rail. Climax Rail Co.

One of the earlier patents is the "Moore" parlor-door hanger, Figure 150. This is a very good form in the main, being hung by a single rod which is mortised into the top of the door. The adjustment may be obtained by turning up the nut at the bottom of the rod, through a hole cut in the edge of the door in the same manner as a stair-rail bolt is turned up. The difficulty is, that the hanger cannot readily be readjusted

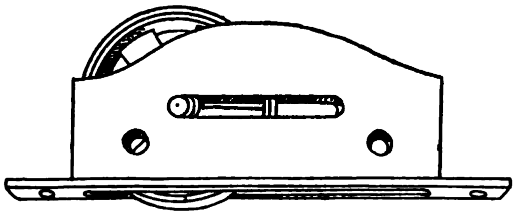

Fig. 149. Hatfield Anti-friction Sheave.

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when once set. Another of the early forms which has since been but little improved upon, is the "Warner" hanger, Figure 151. This consists of two sets of double wheels connected by a rod, and working directly on the double track secured to each side of the door-pocket. The manner of supporting the door is much the same as with the "Moore" hanger, except that in the "Warner" the supporting rods can be got at after the door is finished by means of a face-plate on the edge of the door. The wheels are made perfectly flat, and it is claimed that under no combination of circumstances can they run off the track. The axles of the wheels are attached to the connecting rod by means of a universal bearing, thus enabling the weight of the doors to bear equally upon both tracks, no matter how much out of plumb or level they may be. A somewhat similar door-hanger is that shown by Figure 152, manufactured by the Reading Hardware Company. In this variety, however, the adjustment is entirely from the top of the door, and no mortise is required. The axles are not attached to any part of the hanger, but work in the slot somewhat on the principle of a "Victor" hanger.

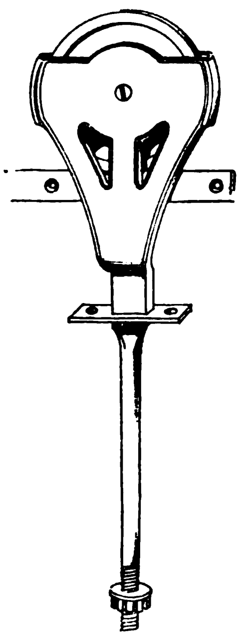

Fig. 150. Moore's Anti-friction Parlor-door Hanger. S. H. & E. Y. Moore.

Figure 153 shows a door-hanger which is very popular, and which for simplicity and perfection of construction is one of the best yet produced. The wheels run on two flat wooden tracks, one secured to each side of the studding. The axles bear on the short connecting rod which is made sufficiently long to allow for the run of an eight-foot door. The rod being round there will never be an even bearing. The hangers are adjusted by means of a sliding screw-joint which is operated from the edge of the door, and which, by forcing the hanger away or drawing it towards the edge of the door, raises or lowers the bearing rod.

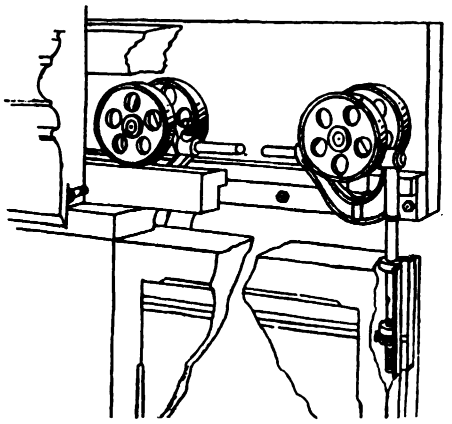

Fig. 151. Warner Parlor-door Hanger. E. C. Stearns & Co.

A very simple application of the same principle is embodied in the "Nickel" parlor-door hanger, Figure 154. This consists of a double set of flanged wheels, which run on a double track suspended by iron hanger-rods attached at intervals to a

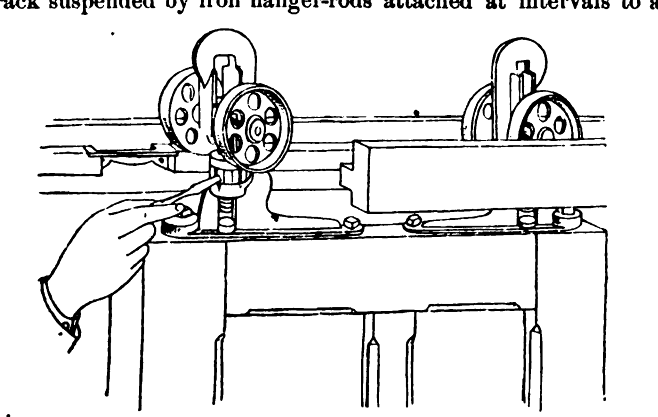

Fig. 152. Novelty Parlor-door Hanger. Reading Hardware Co.

cross-piece at the top of the door-pocket. The axles of the wheels bear against a half-round bar, which is secured by upright bars to the top of the door. The hangers are adjusted by turning up the hanger-rods in the top of the pocket, thus lifting the track bodily. One objection to this form is that it requires considerable width of pocket — four-and-one-half inches.

Figure 155 illustrates the "Richards" hanger, which, with

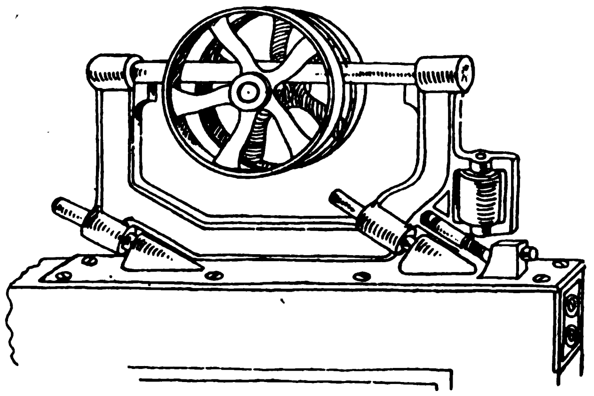

Fig. 153. Prindle Parlor-door Hanger. Prindle Mfg. Co.

the "Prindle," rather leads the market just at present. The principle is almost exactly the same with both forms, except

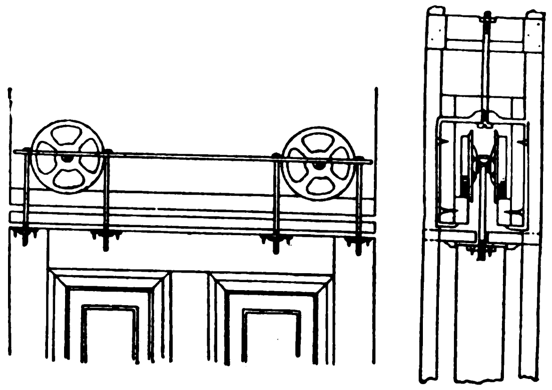

Fig. 154. Nickel Parlor-door Hanger. Coleman Hardware Co.

that in the "Richards" the axle has a flat instead of a round bearing, and the wheels are grooved. The "Prindle" manu-

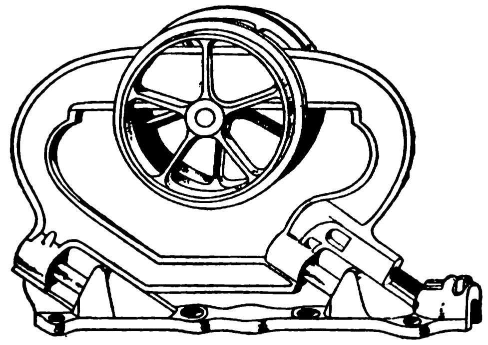

Fig. 155. Richards Parlor-door Hanger. Wilcox Mfg. Co.

facturers claim, that the flat wheel is preferable; the "Richards," on the other hand, maintain that the flanged wheel is

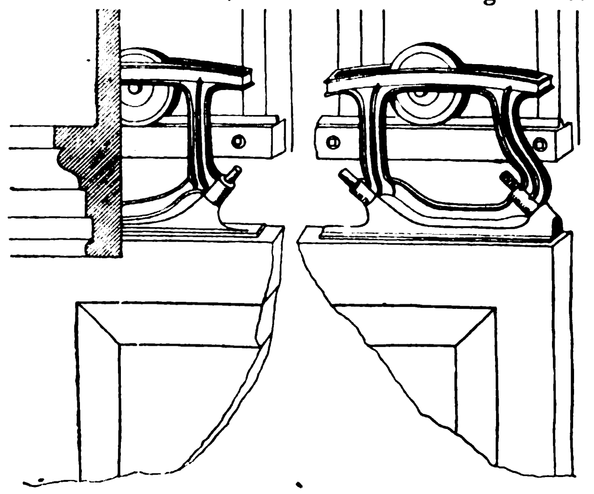

Fig. 156. Paragon Parlor-door Hanger. Dunham Mfg. Co.

more desirable. There is really very little to choose between the two kinds.

The American Manufacturing Company has a parlor

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door-hanger on the market which is essentially the same as the "Richards" hanger. The "Paragon" door-hanger, Figure 156, is on the principle of the "Moody" barn-door hanger previously described. It consists of a single grooved wheel running on a rail secured to one side of the pocket, the axles bearing against two flat surfaces. It would seem as though this fulfilled the conditions of a perfect door-hanger more fully than anything else in the market. It can be adjusted with very little trouble; and as the centre of support is directly over the centre of the door, there is no tendency to bind; while as the track is secured to only one side of the door-pocket, the possible effects of shrinkages and settlements are reduced to a minimum.

A form of door-hanger which is essentially the same as this, but in which the axle of the wheels work in a slot on the principle of the "Hatfield" sheave, has been manufactured by Burditt & Williams, for one of the Boston builders, but has received no patent, and is not really in the market.

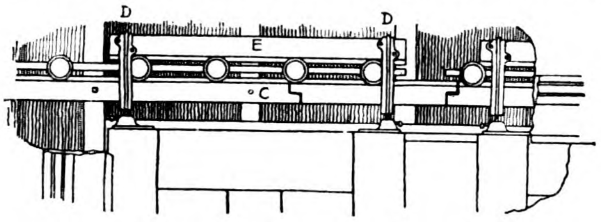

Fig. 157. Emerson Parlor-door Hanger. B. D. Washburn, Agent.

The "Emerson" door-hanger, Figure 157, is yet another variety, and represents in some respects a different principle from any of the former, in that the rollers are entirely separate and distinct from each other, being connected merely by a thin strip of wood notched over the axles. The rollers bear on the wooden rail *C*. The hangers *D*, to which the door is directly attached, are fastened to a rider bar *E*, which bears directly on the rollers. This form of hanger is very effective, does not get out of order, and works very smoothly. Adjustment is obtained by a small set-screw in the attachment of the hanger. The track is fastened to one partition only.

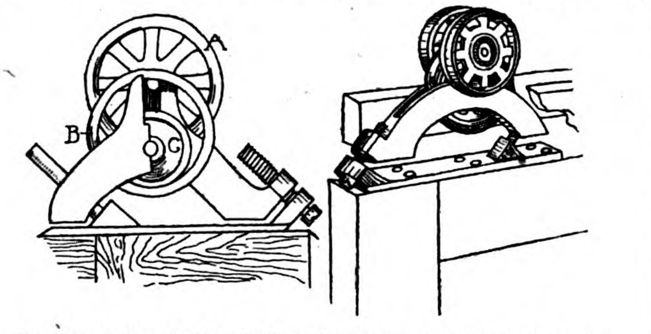

Fig. 158. Endless Anti-friction Parlor-door Hanger. Reading Hardware Co.

Figure 158 is a very ingenious combination of the principles of the "Warner" and the "Prindle" hangers. It consists of a set of double, flanged wheels *A*, bearing on two tracks, and bolted to each side of the pocket. The axle of the double wheel supports a ring *B*, which in turn supports a plain, grooved, pulley-wheel. The axle of the pulley-wheel turns in iron flange-plates which are fastened to the top of the door. In this way the friction is greatly reduced; and the principle of the continuous run of the axle, which is embodied in the "Warner" hanger, is here provided for by means of the ring connected with the flanged wheels, and with the lower pulley. The hanger is adjusted by a turn-screw near the edge of the door. The point of support of the hangers is always in the same relative position to the door, thus overcoming one of the weak points of the horizontal, anti-friction hangers in which the wheels travel back and forth from one end to the other, thus continually changing the strain on the screws.

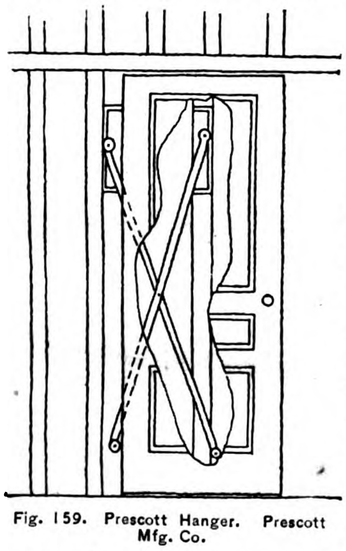

Fig. 159. Prescott Hanger. Prescott Mfg. Co.

The following table gives the relative prices of the various door-hangers that have been described:

TABLE OF DOOR-HANGERS.

Fig.		Per set of four.
138	Acme barn-door roller, 8 inch wheel	$3.00
141	Climax door roller hanger	3.00
142	Moody door roller hanger	3.20
143	Victor door roller hanger	4.40
144	Lane door roller hanger	2.30
145	Nickel barn-door roller hanger	3.50
146	Hatfield barn-door roller hanger	4.50
147	Parlor-door sheave, anti-friction	2.00
149	Hatfield parlor-door sheave	2.50
150	Moore parlor-door hanger	4.25
151	Warner parlor-door hanger	5.50
152	Novelty parlor-door hanger	3.50
153	Prindle parlor-door hanger	5.00
154	Nickel parlor-door hanger, (approximately)	3.50
155	Richards parlor-door hanger	5.00
156	Paragon parlor-door hanger	4.50
157	Emerson parlor-door hanger	5.00
158	Endless parlor-door hanger	3.75

There is still another distinct type of door-hanger, one which is unique of its kind, and for certain purposes is decidedly better than anything else in the market, though not always applicable or always desirable: This is the "Prescott" hanger. It is difficult to illustrate this hanger properly; it should be seen in order to appreciate fully its workings. Figure 159 is the common form of hanger, consisting essentially of two flat bars joined, scissors fashion, in the centre. The lower end of one bar is fastened to a pin on the jamb of the pocket. The lower end of the other bar is fastened to a pin on the back of the door. The upper end of the bar which is fastened to the jamb, works with a roller in a slot on the back of the upper part of the door, while the upper end of the other bar works in a small slot let into the upper part of the jamb-pocket. A little reasoning will show one that the door in this manner is held absolutely free from either the top or the bottom of the door-opening, and can be easily moved forward or backward. It cannot settle without the scissors part spreading out, and as the movable roller ends are on opposite sides, that is, one on the joint and one on the door; any tendency to spreading out of the rollers is counteracted by the opposite ends of the bars, which are always on the same level. In practice, the hanger, when properly set, works to perfection. The door never can bind, but can be operated by the slightest pressure in one direction

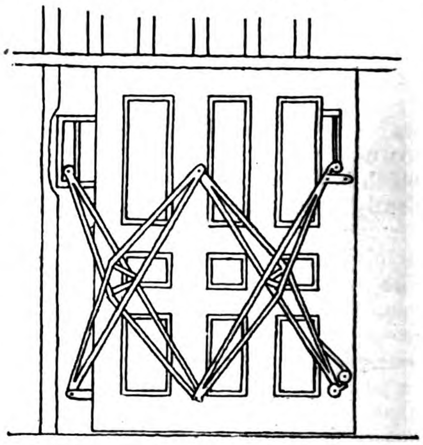

Fig. 160. Prescott Hanger. Prescott Mfg. Co.

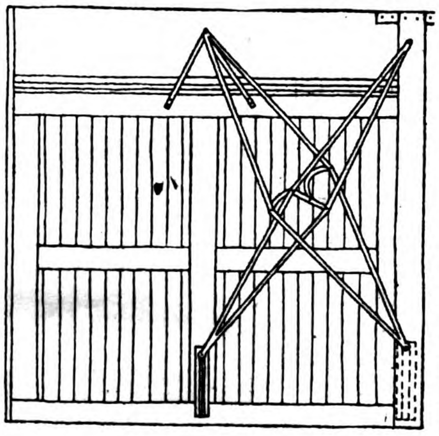

Fig. 161. Prescott Hanger. Prescott Mfg. Co.

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or the other. Figure 160 shows a compound hanger on the same principle for use in very wide doors. The difference is simply that there are two hangers joined by bolts instead of one. Figure 161 shows a trussed hanger, which is used for doors that are wider than they are high. It may be said, incidentally, that these door-hangers can be exactly reversed; that is to say, the fixed ends may be at the top instead of the bottom.

The "Prescott" hanger is used to great advantage for elevator doors, as it permits of an opening the entire width of the car, if desired, while the ordinary width would be half that size. In such a case, a door across half of the opening is hung with ordinary butts, and the rest of the space is closed with a door hung by "Prescott" hangers to the first. The whole, or a part of the opening, can then be left unobstructed for the removal of boxes or trunks. Hangers for this purpose can be made of bronze, so as to present a neat appearance. These hangers are also used to advantage for barn-doors, car-doors, etc., and for any places where the hangers are exposed. The only objection to their use for parlor-doors, is that they have to be put on before the plastering is applied, and they are somewhat less easily adjusted. They also take up considerable width in thickness of the pocket; still, they work so beautifully that they deserve all the popularity that they have enjoyed.

The prices of the ordinary form of Prescott hangers for inside doors, are as follows:

Doors.	
2½ x 8½ x 1⅛ inches	$ 3.25
3 x 9 x 1¼ inches	4.25
3½ x 9 x 1¼ inches	5.25
4 x 9 x 1⅜ inches	6.25
4 x 10 x 1½ inches	6.75
4½ x 10 x 1⅝ inches	7.50
5 x 10 x 1¾ inches	8.50
5½ x 12 x 2 inches	9.50
6 x 12 x 2¼ inches	10.50

[To be continued.]

THE ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

SEMINARY OF ST. SULPICE, MONTREAL, CANADA.

[Gelatine Print, issued only with the Imperial Edition.]

UNION CONGREGATIONAL CHURCH, ROCKVILLE, CONN. MR. W. H. HAYES, ARCHITECT, MINNEAPOLIS, MINN.

THE basement of this building is now under way. The completed structure will cost $60,000 and be finished next season. Materials: Monson granite, Long Meadow brownstone and red brick.

ENGLISH BASEMENT DWELLINGS FOR COL. R. W. TYLER AND GEORGE A. WOODWARD, U. S. A., WASHINGTON, D. C. MR. T. F. SCHNEIDER, ARCHITECT, WASHINGTON, D. C.

THE cost of these buildings will be about $65,000.

THE STATUE OF CHARLES II, IN THE STOCKS MARKET, LONDON.

SEE article on "Equestrian Monuments" elsewhere in this issue.

OUT-BUILDINGS NEAR A COUNTRY HOUSE. MR. R. H. ROBERTSON, ARCHITECT, NEW YORK, N. Y.

HOUSE FOR F. H. CLOUD, ESQ., WALNUT HILLS, CINCINNATI, O. MR. S. E. DES JARDINS, ARCHITECT, CINCINNATI, O.

Y. M. C. A. BUILDING, BRIDGEPORT, CONN. MESSRS. LONGSTAFF & HURD, ARCHITECTS, BRIDGEPORT, CONN.

OUR MOTHER OF SORROWS SCHOOL-HOUSE, PHILADELPHIA, PA. MR. J. J. DEERY, ARCHITECT, PHILADELPHIA, PA.

RAISING A SUNKEN VESSEL BY GAS. — A somewhat remarkable thing took place in the river just below Evansville, Ind., recently. A few days before, the steamer *Robert B. Carson* collapsed and sank in forty feet of water, together with thirty head of cattle confined on the lower deck. For two or three days an effort was made to raise the boat, but the project was abandoned. On Saturday morning, however, to the surprise of one of the harbor boats, the pilot-house and hurricane-deck of the *Carson* suddenly appeared above the water. When a crew was sent down, the steamer was floating along, upheld by some mysterious agency. This was subsequently traced to the cattle themselves, whose bodies had become inflated by gases generated in the carcases, and actually had lifted the steamer to the surface. — *N. Y. Evening Post.*

MEDIÆVAL HOUSES.[1] — V.

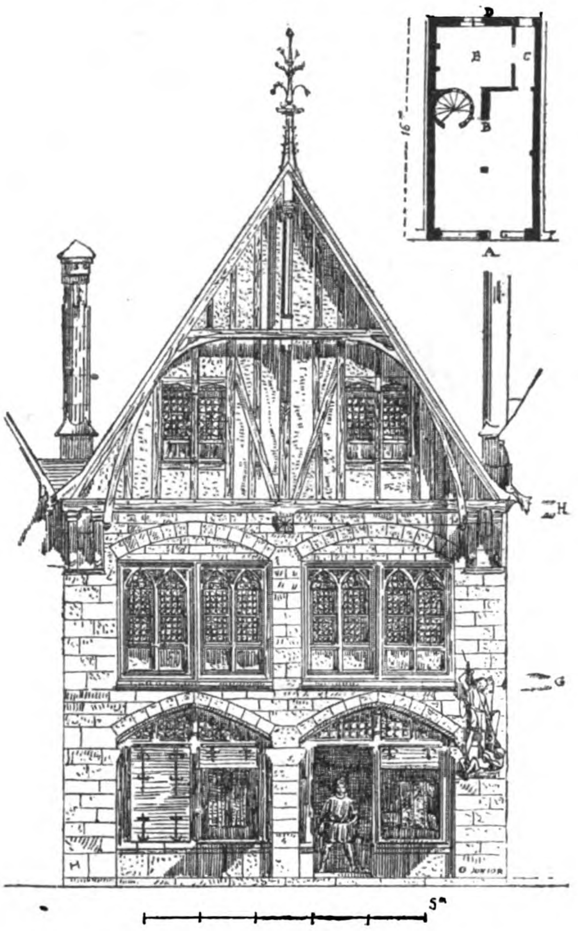

Fig. 20.

FIGURE 20 is a house of masonry and wood, sketched at Châteaudun, in 1841. The ground-floor and first-story are built in stone, the party-walls in rubble masonry, and the rear wall on the court in stone. On the ground-floor (see plan *A*,) and opening upon the street is a large store, with columns through the middle and a partition-wall *B*, in the rear. A large beam, carried on the cap of the pier in the middle of the front, on the central posts and on the partition-wall, supports the joists. A lighted spiral staircase ascends to the first and second floors. From the passage, *C*, one enters the court, *D*, and a back room, *E*. On the first story the plan is the same, a large beam being carried across the front wall to bear the floor-joists. To obtain the greatest possible amount of light on the street-front the builder has joined two relieving-arches in the thickness of the wall, under which broad windows are set. There are two rooms on the top floor under the roof. A pair of rafters projects beyond the wall and shelters it. They are carried on the ends of the plates, relieved by brackets, and on the end of the middle purlin, similarly supported. The floor-rafters are laid at *H*, and *G*. The construction of this house assigns it to the beginning of the fourteenth century.

Figure 21 gives the plan and elevation of a house in Laval, of a more recent period, in which the wooden structure has more importance and rises in successive corbellings above the ground-floor. This house, whose front is on a steep slope, is intended for two families. The slope of the street has enabled the builder to give an entresol, *A*, to the occupants of the left side, floor-levels being at *B*, and *C*; those in the right have only a high ground-floor and a first-story, the floor-beams being at the level, *C*.

As is indicated by the plan, *P*, each house has its own stairway leading from the shop to the first-story. A wooden beam is carried up the middle of the front and divides the two dwellings from top to bottom. The panelled front of the first story projects over the plain, half-timbered ground-floor, and rests on three corbelling-beams.

The front wall of the first-story is protected by the projection of the rafters carried on the ends of the plates, *S*.

The corner-posts on the front are there only to protect the wooden panelling, for behind these posts are party-walls of rough stone carrying the chimneys. The masonry of the front ceases at the ground-floor in the left dwelling, but is higher for the one on the right. The panels in this example are filled-in with rough masonry between the posts. The two examples bear witness to the free and frank application by mediæval architects of the simple and sensible methods of their art, and to their good judgment in profiting by conditions of site and quality of materials, carrying out the programme given them without keeping to conventional forms, but scrupulously

[1] Translated from the French of Viollet-le-Duc, by Mr. A. B. Bibb. Continued from page 150, No. 666.

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observing the principles of solid and durable construction; and that they had mastered those principles there can be no doubt, for the houses they built by such simple and inexpensive means have already lasted five centuries. The fashion of corbelling wooden fronts was followed mainly in the cities, and that system of construction was not in vogue in all the provinces comprising the France of to-day. It was rarely met with north of the Loire, and reached in the middle and the east a very imperfect development. In Bresse, for example, the wooden houses of the fourteenth and fifteenth centuries had wooden fronts in which the system of building with squared

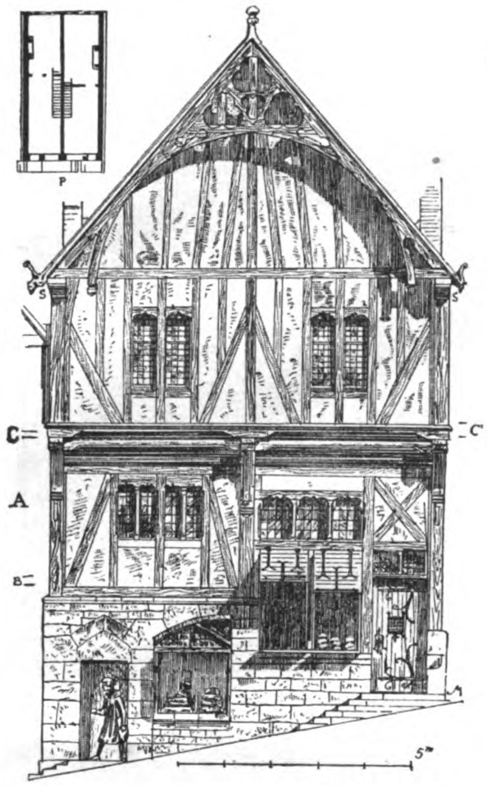

Fig. 21.

logs, followed to-day in Switzerland, appears in conjunction with the more advanced processes of carpentry.

This system of piling up squared timbers, belonging to certain populations whose ethnical character is recognizable, is also dependent upon the abundance of resinous trees, straight like the pine of the Vosges, of the Jura and the Alps. Oaks, requiring much troublesome squaring are seldom used in that sort of timber-work, but the naturally straight and easily squared trunks of pines accommodate themselves readily to log building. In the eastern and middle provinces, at this time, large areas were covered with splendid forests. In Haute-Loire, in Loire and Ardèche, a part of ancient Lyonnais, the mountains, bare to-day, were four centuries ago covered with forests of an hundred years growth protected by the feudal laws.

In the little town of Annonay there are, or at least there were several years ago (for the old buildings disappear like the leaves in autumn), a few houses of the fourteenth and fifteenth centuries, which had survived the fires of the sixteenth century, almost entirely built of wood in a mode of construction which deserves to be studied. Figure 22 represents one of them which may be classed among the houses of the fourteenth century. Above a ground-floor, built of large blocks of stones, is laid a deep furring of pine, the third row of which, forming the floor, projects from the front in corbelling and carries the panelled front of the first story, which has three beams carried across the face with their ends framed into the corner-posts, between which are other vertical timbers framed into the beams. On the sides the ordinary wooden panels, filled-in with rough stone and mortar, formed the partition-walls. Above the first story a second projecting floor receives a second story, also with panelled front, surmounted by a deeply-projecting roof, the combination of which our illustration sufficiently explains. The projection of the roof over the wall of the ground-floor is about 3.50 m., and the front was thus perfectly protected from rain and snow, the arrangement being well suited to the climate of that country, which is hot in summer and very cold in winter.

These wooden houses differed somewhat from those built north of the Loire, where other traditions and different wants were felt. The people of Lyonnais wanted less lights and more perfect shelter. At Annonay they not only protected the house-fronts from sudden storms of snow, but also the streets, so as to allow the circulation of the inhabitants in winter. In the Middle Ages, no matter what may be said by the detractors of that period, the citizen did not shut himself up in the brutal egoism so common to-day. In building his house he remembered that he was a citizen, and he built for himself and for his city. In our time inspectors of the highways protect the common interests. In those times the rules of inspection were less complete and less provident, but each citizen thought a little more of the general interest and tried to assure the well-being of all. This alliance of general and private interests between all the inhabitants of a town is more effectual than the most complete and best-executed ordinances. From an artistic point of view the result is very interesting in other respects, and as is the case with private benefactions as compared with public charity, if the latter is more regular and perhaps more efficacious, the former are more delicate and intelligent.

The construction of houses by "empilage" becomes more characteristic as we approach the Alps. At Nantua (Ain), there are still to be seen several houses of nearly the same period as that of Annonay just given, whose structure approaches more nearly to that of the Swiss "chalet." We trace in them the most ancient traditions (see Fig. 23). The manner in which the wooden panelling of the first-story is laid on the masonry, the double beams under the roof, belong only to certain people who employed solely the method of timberwork by empilage, whilst the outline of the rafters, forming a penthouse, and certain parts of the wood panellings resemble the joined timber-work so common in the north of France. A complete and critical study of these old remains of dwellings on the soil of the Gauls would materially aid in a classification of the races spread over this territory. The religious edifices and the châteaux were often built under influences foreign to the soil where they are found to-day, whereas the dwellings preserved the primitive native traditions. In England, for example, all constructions of wood of the fourteenth and fifteenth centuries have a certain analogy with the art of naval carpentry: the mixture of woods, their relative strength, the frequent use of curved timbers, suggest the combinations of timberwork used in ship-building, while at the same time we find in the north of France a system of timber-work which uses wood only for framing. In the east a more ancient system, belonging to the original population of the region between the Haute-Loire, the Saone, the Alps and the Jura, and in the west and south a very limited sys-

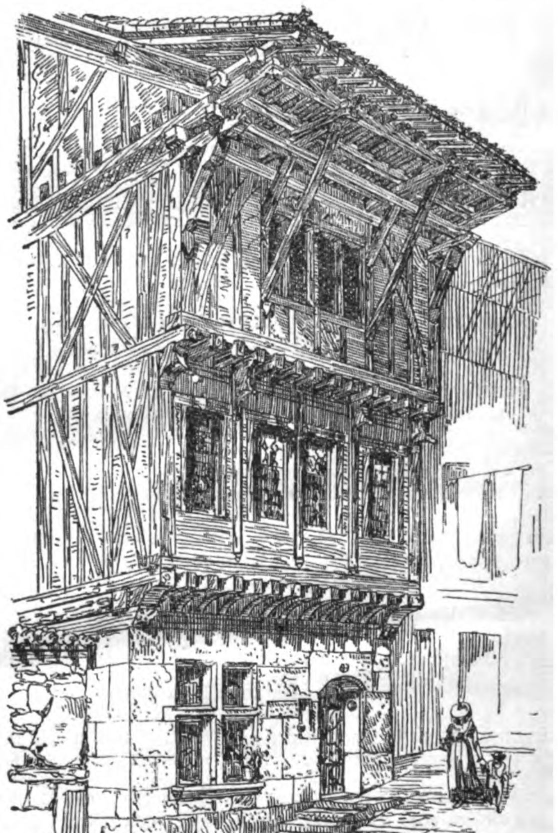

Fig. 22.

tem, in which wood was used only for floors, joists and rafters and masonry for the front, side and partition walls are also found.

We are much inclined to believe that houses of certain countries in the Middle Ages differed but little from those built by their inhabitants before the Roman domination. The Romans had exercised an influence over the building of dwellings only in some few of the provinces, in Provence, a small part of Lyonnais, Languedoc, Saintonge, Angoumois, Perigord and part of Bourgogne. Everywhere else traditions going back to great antiquity were preserved, and toward the fourteenth century, save in Provence and Languedoc, there was a definite anti-Roman reaction, so far as the building of

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dwellings was concerned. It seemed that at this epoch the old Gallic nation was restored and with it the architecture whose principles had lain dormant for a time. Secular feudality, so far from impairing this movement, seems, on the contrary, to have aided it, not certainly from a particular taste for any form of art, but because of an incurable aversion to monastic institutions, which, as we have said, preserved the Gallo-Romanic traditions purely enough.

The Mediæval period is one composed of very diverse and often opposite elements; and it is difficult without entering into a long ex-

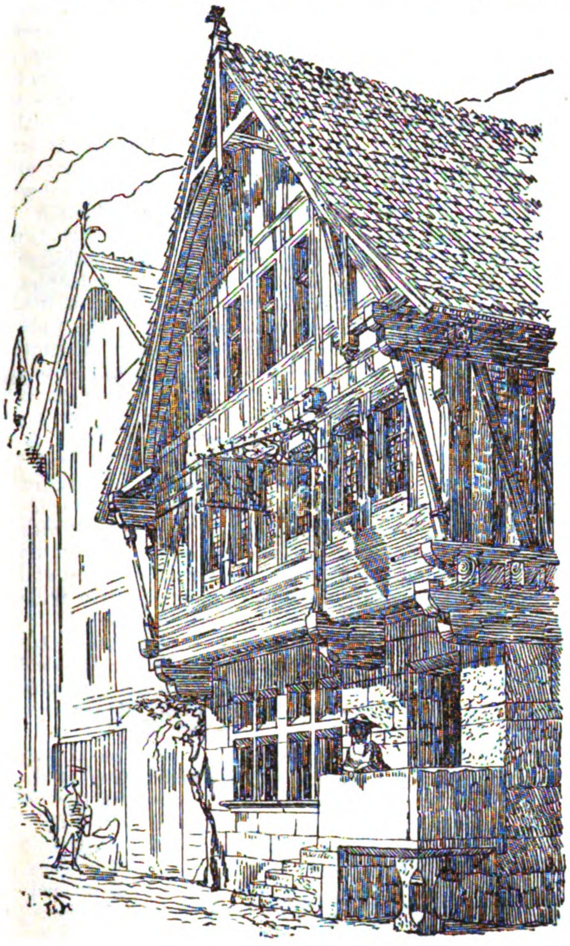

Fig. 23.

position to describe the singular effects produced all at once in the breasts of a people who were unceasingly active.

In the dwellings of town and country, as well as in political history, do we find traces of that national movement which commenced during the reign of Saint Louis, and continued with marvellous activity through the fourteenth and fifteenth centuries, and during times of invasions, wars and miseries without number. In towns where the arts were practised, the methods of construction departed from the traditions preserved in the convents; returning to wood-constructions

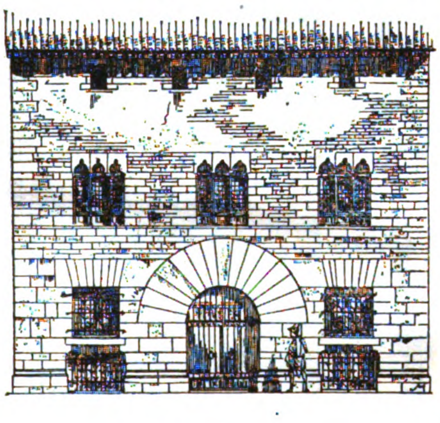

Fig. 24.

they plunged into bold combinations which permitted timber-work; they enlarged the openings in the fronts of their houses, so making the streets almost a part of them, and the lives of all the citizens almost a common one. There resulted necessarily from this intimate neighborhood a perfect union of the citizens. Without descending to the public street they could talk from house to house. In certain streets of the fourteenth century the people formed a conventicle by simply opening their windows. The struggle of the people against the secular and clerical powers brought into use many architectural forms which seem very odd to us to-day. The houses of the times, however open their fronts, formed between them impenetrable alleys, whose walls almost touched at the top, leaving at their base easily barricaded passageways. The strength of the citizen lay in concentration, in union of means and coöperation. Safety was found in grouping their houses as much as possible, so as to put their inmates into immediate communication. Timber-work lent itself more easily than masonry to this contracted disposition and system of lighting, beside taking up less of the precious ground-space. It is not surprising that in cities which near the fourteenth century had acquired a certain independence and privileges, and had become in-

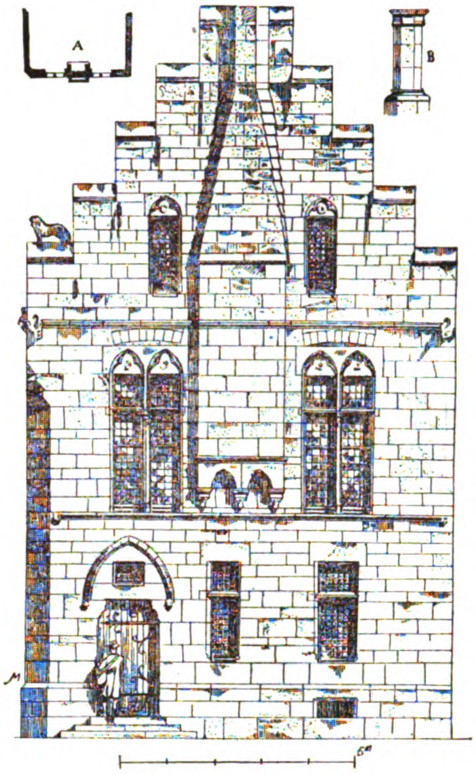

Fig. 25.

dustrious and rich, wood-construction had been almost exclusively adopted. In the southern towns, where the traditions of the Roman municipality were never entirely lost, and where there had not been that fierce struggle against the feudal power and the might of the Church which had borne even more heavily upon the cities than the power of the laity, domestic architecture adhered to stone-construction, and, relatively, wider streets, and did not adopt the very open fronts. The clerical feudal power was felt more heavily in the towns of the north than elsewhere. Toward the end of the twelfth century the bishops in an effort to lessen the exaggerated importance of the monastic institutions, which had absorbed to their profit a great part of the diocesan authority, and desirous also of encroaching on the laic feudal power, connived with most of the large towns to the north of the Loire to build cathedrals which should become the monuments of those cities, in which the citizens could assemble at their will to attend to public affairs, have their law-suits adjudged, and to plot, as the bishops fondly hoped, the destruction of the colossal power of the abbeys and the barons.

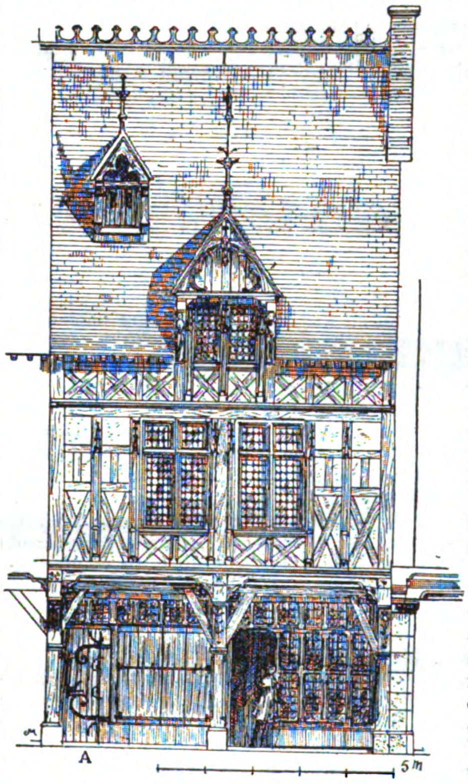

Fig. 26a.

This attempt, although seconded with extreme ardor by the cities, failed partly because of the protestations of the four barons sent in 1246 to the King, Louis IX, and partly as a result of the establishment of the royal bailiffs; and the common people, forming a closer

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alliance with royalty whose protecting power they felt at that time, soon ceased to submit to the erection of these immense basilicas which had been looked upon as fortresses of their future liberty, and began to oppose the feudal power of bishops and chapters, whose greatest strength was always in the cities.

This struggle, helped on by the lay lords and tolerated by the royal power, the king finding it a means of extending his authority, kept the people of these towns in a constant ferment, while at the same time it gave them an idea of their power if united. From this time until the end of the fifteenth century, the dwellings we have been

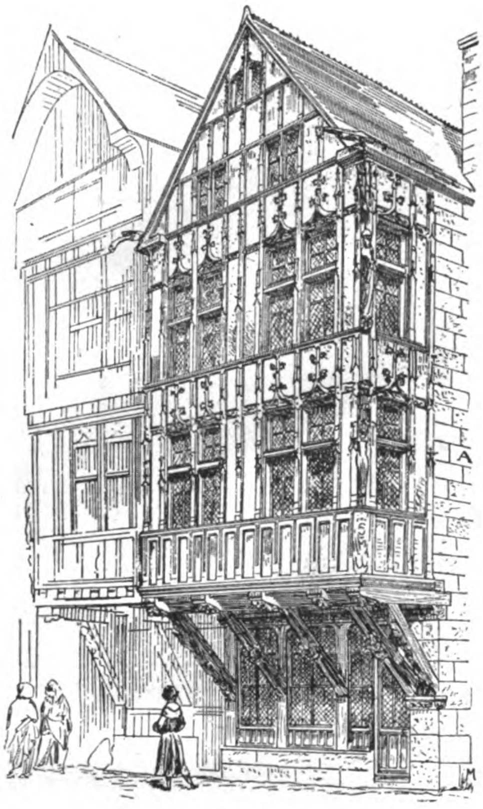

Fig. 26*b*.

describing as being closely joined, very neighborly and almost exactly alike in plan, characterized the architecture of the towns.

A study of the customs of the Middle Ages helps us to find the reasons of their architecture. The Romans passed a great part of their time in public monuments or basilicas, under the porticos, in the hot baths and the games, in theatres, circuses, amphitheatres and the like, and though we have in our own day a multiplicity of public buildings, the modern student looking over a plan of ancient Rome, wonders where the inhabitants of that populous city could have lived. The Romans, excepting the owners of immense palaces, did little more than eat and sleep in their own houses. In the Middle Ages, on the contrary, each family lived in its own domicile, the citizens had no time for assemblies, and even had the towns been rich enough to build public edifices, the principles of feudal Government would have opposed them. The church was the only building in the town where public meetings were permitted, which explains the eagerness with which the populous towns came to the aid of the bishops when they projected the great cathedrals. But when this scheme was suddenly thwarted and the people found in the royal protection a real security, they set themselves to building dwellings with an ardor altogether new. Wood lent itself marvellously to the ready satisfaction of their wants, combining the advantages of rapidity of execution with cheapness, and, what was still more important, economy of ground.

Everywhere, then, until the end of the sixteenth century architecture followed its regular course; it improved the dwellings, made them lighter and more commodious, but continued to employ the Roman methods. The shape alone was modified. There are in Bourgogne, Lyonnais, Limousin, Perigord, Auvergne and Languedoc houses of the fourteenth and fifteenth centuries which differ from those of the twelfth and thirteenth only in the style of their architecture. Neither the construction nor the disposition of these dwellings is modified in a sensible degree. In the still more southern provinces, which, in the fourteenth century were not French, there were built at this period many dwellings whose style very closely preserves the Roman character. There is, for example, one among several houses in Perpignan, used in late years as a court-house, which shows a front of a style almost antique, in despite of details borrowed from the "Aragonais" school of that period (Fig. 24). In the east the traditions of Roman house-construction were followed much later, that is to say, until the fifteenth century. Certain houses in Trèves, Cologne and Mayence, built in the beginning of the thirteenth century, were they in the Ile de France and Champagne, could pass for Roman houses. There are still found in several of these dwellings particular arrangements which in France pertain only to the twelfth century, or to the beginning of the thirteenth, such as, for example, chimneys carried on corbelling upon the front walls from the first floor. Figure 25, gives the front of one of these old houses in Trèves dating from the beginning of the fourteenth century, which has a chimney on the middle of the gabled wall on the street. The fireplace is built where shown in the plan *A* and the flues topped by the crown *B* are carried on three brackets, shaped like capitals and on two arches, between the windows of the first story. It must have been very agreeable, whilst warming oneself to be able to enjoy the outside view. Windows so placed enabled one to work before the chimney-place and to keep warm without being annoyed by the reflection of the flame. The people of that epoch had learned to secure their comfort; we, of to-day, do not seem to have gained so much, a fact which not unnaturally makes us somewhat dubious of our superior skill and wisdom. However primitive this comfort may have been, contemporaneous architecture, at least, entirely subserved it, while our own architecture (at least that which we wish to persuade ourselves is ours) is in perpetual discord with our indoor habits. Let us return to the houses of the French cities of the fourteenth and fifteenth centuries, in which period wooden houses were in the majority. They generally showed their gables to the street, building-lots being rather deep than wide, for the reason which always rules in cities that the street-front is the most valuable ground. However, if the site were on a corner gables were raised on the side walls, and the wood-panelled street front was guttered.

Figure 26, is a house of Beauvais which shows this arrangement. On the ground-floor is a porch with stores at the back, such as can be seen at Rheims. The first story is composed of two rooms, to which access is gained by a spiral staircase built at the back of the passageway *A*. Under the roof is a large room lighted by two dormer windows, one on the street, the other on a little court. This dwelling dated from the beginning of the fifteenth century. There still exist at Orleans several houses of this kind, though without the porch. After the war of independence in the fifteenth century, when the English were forced to abandon the north and west of France, there were, during the reign of Louis XI, unmistakable evidences of prosperity among the city people. A great number of private dwellings were erected at Paris, Rheims, Beauvais, Rouen, Orleans, in all the cities of Normandy, in Picardy and in the Ile de France. Ground in the cities acquired considerable value. Full circulation on the street was secured by suppressing even the porticos whose pillars or posts were an embarrassment, and they built the fronts corbelling over the streets from the beams of the first-story. These fronts became thus true "bretèches," wide and having at the floors two metres of projection. This system of construction obtained in those streets which opened on the market places, which were almost always surrounded with porticos. There is still to be seen at Rheims a house whose front in wooden panels, perfectly preserved from top to bottom, is carried on corbellings of five strong supports and is projected 1.65m. over the public street (26*b*).

Fig. 27.

On one side a partition-wall *A* of stone, carried the chimneys and supports two brackets, on the other side is a simple wood partition. The wooden statues which were carved on the corner-posts on the wall side no longer exist, but the two end brackets show carvings in half-round relief, on one side Samson killing the lion and on the other St. Michael overthrowing the demon. This projecting panelled front with side lights is finished and carved with great perfection, and it must have been splendidly framed to have so long maintained its shape, although in its whole height there is not a single cross of St. Andrew. The spaces between the posts are filled with masonry and stucco. At Figure 27, is given a timber-work house at Rouen, four stories high, a little older than the preceding example, belonging in fact to the first half of the fifteenth century. It stands at the angle of two streets. The wooden fronts of each story are corbelled one beyond the other (see the cut, *A*) so that the third story covers a sur-

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face sensibly larger than the ground floor. The cornice at the base of the gable represents a sort of machicoulis. In the fifteenth century the windows were numerous and small, a necessity of construction when the woodwork was carried to a great height, such constructions by reason of the material employed being subject to movements. The window-frames were often put out of place, strained or warped by the shifting of the timbers. It was frequently necessary to take them out and replace them. The smaller sashes were much less sensible to changes of temperature or followed more easily the movements of the timber-work. The panels strengthened by cross-braces prevented the warping of the window-jambs and the weights of the front were principally carried on the corner-posts.

[To be continued.]

EQUESTRIAN MONUMENTS. — X.[1]

PASQUINADES.

An Old Pitcher.[2]

"AND what is Pasquino doing?" said Marforio, one morning. "I am taking care of Rome that it does not go away to Urbino," was the satirical rejoinder that Pasquino made twenty-four hours later. This particular interchange of wit was intended to express resentment at the partiality that Clement XI showed to his native town, Urbino, at the expense of the citizens of Rome, and was but one of a series of epigrams that the early riser might read posted on the pedestal of one or the other of these famous statues which indignant or discontented citizens had selected as the mouth-piece to give expression to their dissatisfaction at the existing state of things, a dissatisfaction mainly directed at the venalism of the reigning pontiff. The statue known as Pasquino[3] was a mutilated figure set up at the end of the Palazzo Braschi, near the Piazza Navona, a neighborhood where, in the latter part of the fifteenth century, was the shop of a shrewd-tongued, gossipy tailor which was frequented by the upper classes, who gathered there to interchange the news of the day and laugh at the brilliant sallies of the witty tailor. It was after his death that the statue, which had long lain half embedded in the ground, was set up, and at once the fiction was established that it was Pasquino who had come back to life again for the purpose of continuing at the old stand the agreeable task of launching in writing those bitter epigrams which the hand of death had prevented his voicing orally. However keen a watch was kept, some one was found skilful enough to affix the skit without detection; and as in life the tailor's wit was drawn out by some clever interlocutor, the colossal reclining statue of the river-god Marforio was selected as his gossip. Free speech was not for those days and the populace delighted in this early attempt to perform the work that is now carried on by the unbridled morning newspaper.[4] The scandal, for the epigrams and verses were often scurrilous in the extreme,[5] at length reached such a pitch that at the close of the sixteenth century the statue of Marforio was removed to its present position in the Capitol. As for Pasquino, Adrian VI threatened to have him thrown into the Tiber, but a friend, Ludovico Suessano, dissuaded him from it by declaring that if he did the very frogs would croak pasquinades against him. Pasquino knew his power and did not hesitate to flaunt it in the face of the victim of his corrections, and once his pedestal bore this question, addressed to Paul III [1534–49]. "Great sums were formerly given to poets for singing: how much will you give me, O Paul, to be silent?"

This particular form of pasquinade has been used also in later times; thus when the equestrian statue of Louis XV, by Bouchardon, was set up in what is now the Place de la Concorde, Paris, the pedestal being adorned with statues of Strength, Wisdom, Justice and Peace, by Pigalle, there appeared one morning on the pedestal the following couplet:

"Grotesque monument, infâme piédestal!
"Les Vertus sont à pied, le Vice est à cheval!"

And a short time after the following appeared:

"Il est ici comme à Versailles.
"Il est sans cœur et sans entrailles."

While a third epigram, of the briefest, was simply:

"Statua statuæ."

A somewhat closer analogy can be found in the case of the equestrian statues, of Charles I, at Charing Cross, and of Charles II, in the Stocks Market, London, though in this case, the pasquinade was published and not merely affixed to the pedestals of the statues. In 1674, Andrew Marvell, who seems to have had little love for the Stuart family, wrote a clever skit which purports to be a dialogue held between the horses which upbore these despised monarchs, and each quadruped sought to mitigate the shame he felt at his own ignoble service, by casting reflections on the rider of his fellow.

The dialogue is thus introduced:

If the Roman Church, good Christians oblige ye
To believe man and beast have spoke in effigie,
Why should we not credit the public discourses
In dialogue between two inanimate horses.

The horses, I mean, of Woolchurch and Charing
Who told many truths worth any man's hearing,
Since Viner and Osborn did buy and provide 'em
For the two mighty monarchs who now do bestride 'em.

The stately brass stallion and the white marble steed
The night came together, by all 'tis agreed.
When both kings were weary of sitting all day
They stole off, incognito, each his own way,
And then the two jades after mutual salutes,
Not only discoursed but fell into disputes.

It is in the course of these disputes that they indulge in mutual recriminations, one attacking the profligacy of the second Charles, the other reflecting on the despotic acts of the first. The bronze horse, apropos of the report that Charles II had embraced the Catholic religion, said that it was wondrous

"That he should be styled 'Defender of Faith'
Who believes not a word that any man saith"

And adds:

"Though changed his religion, I hope he's so civil?'
Not to think his own father has gone to the devil."

The conclusion reached in their midnight discussion is thus expressed:

"'But canst thou devise when things will be mended?'
'When the reign of the line of the Stuarts is ended.'"

The statue of Charles I at Charing Cross still endures, but the other party to this midnight colloquy has, with his rider, disappeared entirely, or, at least, sought such seclusion that, if it still exists as a whole, its resting-place is unknown; while if it has undergone a third step in its career of transubstantiation, it is not possible to identify either horse or rider as parts of any now existing statue.

The devotion that the Stuart kings were able to arouse in the hearts of their followers was the cause of many of the most romantic incidents of their times, which story-writers in prose and verse have not been slow to take advantage of, and the vivid-colored lives of the leading cavaliers are in this way as familiar to us as their parti-colored clothes are through the portraits that still hang in private and public galleries. At the Restoration this devotion had free vent, and he was surest to win the monarch's favor whose wit could evoke the most taking form of flattery.

Robert Viner, a worthy goldsmith, and by consequence one to whose purse the ever-necessitous Charles may have more than once had recourse — and money-lenders were generally pretty sure of their cent per cent in dealing with him — was in 1668 Lord Mayor of London, perhaps as a reward for his complacency in holding his purse-strings with a slack hand when the King was his visitor, and seeking, perhaps, how he might glorify himself and secure further advancement, determined to erect a statue to the honor of the recently restored monarch. But having been bred up in mercantile ways, he knew the value of his money better, perhaps, than he understood art, and having in the course of recent travels in Italy come upon, at Leghorn, an unfinished and neglected statue, he procured it at a bargain. As to his practical mind there was no unseemliness in giving the order to convert the figure of stern and upright John Sobieski, King of Poland, into the wine and woman loving Charles Stuart, the Pole's head was removed, and the Anglicised Scot's substituted in its place by Latham, and the Turk upon whom the horse was trampling was rechristened Cromwell, though so little heed was taken to conceal the Hebraic character of the proceeding that this figure was allowed to retain its original turban. It is barely possible there may have been in this a further merry jest in representing the ascetic Roundhead leader in the guise of a harem-keeping infidel.

This marble statue, which Viner at first wished to set up before the Royal Exchange, but which he was not allowed to place there because of the "bignesse" of the group, was finally set up in the Stocks Market on May 29, 1672, on a freestone pedestal, eighteen feet high, ornamented with niches and dolphins, and enclosed by an iron fence; and the water-conduit near which it was placed on that day poured forth claret. Here it stood till 1738, when it was removed in order to make way for the Mansion House, and was for many years stored in an inn-yard, where the rider was probably as little out of place as his steed.

The following rhymes on the occasion of taking down the statue allege that the figure on the horse had represented Cromwell also; but this is an anachronism, the Protector being dead before Sobieski won his great battle:[6]

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[1] Continued from No. 670, page 197.

[2] After Fairholt's "*Rambles of an Archæologist.*"

[3] This statue is said to have represented Menelaus trampling on Patroclus. Bernini declared that it was the finest piece of ancient sculpture in Rome.

[4] The public opinion of Rome, has only one traditional organ. It is that mutilated block of marble, called Pasquino's statue, . . . on which are mysteriously affixed by unknown hands the frequent squibs of Roman mother-wit on the events of the day. That organ has now uttered its cutting joke on the Fathers of the Council. Some mornings ago there was found pasted in big letters on this defaced and truncated stump of a once choice statue the inscription "*Libero come il Concilio.*" The sarcasm is admirably to the point. — *London Times*, Jan. 16, 1870.

[5] When in the time of Pius VI, the loaf of bread was greatly reduced in size, one of these little morsels was hung here, with the inscription "*Munificentia Pii Sexti,*" a take-off on this Pope's practice of labelling with this statement all buildings erected by him.

[6] The connection is not clear, as the statue was erected in 1672, years after the Restoration, and before the siege of Vienna, which took place in 1683. Of course the statue never represented Cromwell.

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THE LAST DYING SPEECH AND CONFESSION OF THE HORSE AT STOCKS MARKET.

Ye whimsical people of London's fair town,
Who one day put up what the next you pull down;
Full sixty-one years have I stood in this place,
And never till now met with any disgrace.
What affront to crowned heads could you offer more bare,
Than to pull down a king to make room for a mayor.
The great Sobieski, on horse with long tail,
I first represented when set up for sale;
A Turk, as you see, was placed under my feet,
To prove o'er the Sultan my triumph complete.
Next, when against monarchy all were combined,
I for your Protector, Old Noll, was designed.
When the King was restored, you then, in a trice,
Called me Charles the Second, and by way of device,
Said the old whiskered Turk had Oliver's face,
Though, you know, to be conquered he ne'er felt the disgrace.
Three such persons as these on one horse to ride —
A hero, usurper, and king all astride:
Such honors were mine; though now forced to retire,
Perhaps my next change may be something still higher.
From a fruit-woman's market, I may leap to a spire
As the market is moved, I'm obliged to retreat,
I could stay there no longer where I'd nothing to eat:
Now the herbs and the greens are all carried away,
I must trot unto those who will find me in hay.[1]

If lost to public sight, it had been kept in mind by the descendants of the worthy ex-Lord Mayor, and in 1779, on the petition of Robert Viner, Esq., the Common Council presented the group to him, and it was at once moved from London to his family country-seat. What became of it on the extinction of the Viner family is not known. Very likely it became a "lot" at the final auction sale of family-plate, furniture, pictures, and bric-à-brac, and it is not unlikely that, if the records were imperfect, the glib-tongued auctioneer may have hesitated long to which one of the lately deceased's forbears he should ascribe the uncommon feat of trampling upon turbaned Turks, while himself arrayed in the undress of Classic attire.

The prints of the period do not give a very clear notion of what the artistic merits of the statue really were, and there was so obvious an invitation to jest in the turban-covered Cromwell that the real merits of the sculpture may have been overlooked, particularly when there were added the flouting gibes of the free-tongued wits, who did not hesitate to follow the example of Lord Rochester, who, in 1676, in his lampoon, "*The History of the Insipids*," declares that:

"Could Robin Viner have foreseen
The glorious triumphs of his master,
The Woolchurch statue gold had been
Which now is made of alabaster:
But wise men think, had it been wood
T'were for a bankrupt king too good.

"Those that the fabric well consider
Do of it diversely discourse.
Some pass their censure on the rider,
Others their judgment on the horse:
Most say the steed's a goodly thing,
But all agree 'tis a lewd king."

THE STOCKS MARKET. — "The Mansion-House and many adjacent buildings stand on the site of Stocks Market; which took its name from a pair of stocks, for the punishment of offenders erected in an open place near this spot, as early as the year 1281. This was the great market of the city during many centuries. In it stood the famous equestrian statue erected in honor of Charles II. . . . The statue was removed in 1738, to make room for the Mansion-House." From Pennants "*London*," p. 368.

"The Stocks Market was removed in 1737 to Farringdon Street, and was then called Fleet Market." — From Thornbury & Walford's "*Old and New London*."

CHARLES II. — ("The Merry Monarch" — "The Mutton-eating King.") King of England; son of Charles I; born May 29, 1630; landed in Scotland, 1649, and was crowned at Scone; defeated at Dunbar and Worcester; fled to France, but was restored to the English throne by General Monk, 1660; married Catharine of Braganza; joined the triple alliance against Louis XIV, with whom he soon made a secret-treaty; died 1685.

JOHN SOBIESKI. — ("The Wizard.") King of Poland. Born 1624. Died 1696. Raised the siege of Vienna by the Turks in 1683. He sent the Mussulman standards captured before that city to the Pope, with the message, "I came. I saw. God conquered."

THE WOOLCHURCH STATUE. — Sir Robert Viner was a famous goldsmith. The statue was referred to by Rochester and Marvell as the Woolchurch one, because of its proximity to the site of the church of St. Mary's Woolchurch which formerly stood in the Stocks Market. It was burnt in 1666.

[To be continued.]

COMMUNICATIONS

FRENCH LAWSUITS.

MONTREAL, CAN., October 20, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In your issue of the 28th of April last, there is an article on "A case in France of Architects' Mutual Defence Society" in which there is mentioned a suit between the officials of a certain hospital and their architect; the verdict resulting in favor of the architect. Will you kindly in your next issue give the names of the parties to the suit and also where the French law referred to by the judge can be found, and oblige,

Yours respectfully, A SUBSCRIBER.

[THE *Bulletin* of the Architects' Mutual Defence Society gives only the initials of the names of parties to the disputes in which the Society intervenes. This particular suit is given as being between M. P. ——, architect, and the Hospital, or Asylum, (Hospice) of Ch. ——Ch. The decision was given by the Conseil d'Etat, July 15, 1887. The text of the decision contains no references to other cases. — EDS. AMERICAN ARCHITECT.]

AUTOMATIC VENTILATORS.

CINCINNATI, O., October 18, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Can you give me the name and address of the manufacturers of automatic opening and closing louvre ventilators (made of sheet-iron, I think)? You would greatly oblige,

Yours very truly, A. O. ELZNER.

[THE ventilators with slats hung so as to close against an inward current, but open to allow an outward current to escape, were made in Boston years ago by a company which has now gone out of existence, and we do not know that they can be had anywhere. Perhaps an ingenious galvanized-iron worker could make them to order. — EDS. AMERICAN ARCHITECT.]

NOTES & CLIPPINGS

OLD ROMAN PLANK ROADS. — The Prussian Minister of Education, von Gossler, having learned that Prof. F. Knoke had lately found traces of old Roman plank roads on the moor between Mehrholz and Brägel, not far from Diepholz, in Lower Hanover, invited that gentleman to fully investigate the matter. He has just completed the task. He was able to trace the lines of two parallel plank roads right across the moor, presenting all those distinctive features which are found in Roman works of this kind. One of them shows evident signs of having been demolished by force, the boards, which were originally fastened with pegs to the bearers, having been violently torn away and buried in the bog to the right and left of the track. The other road seems to have fallen into decay, but there are signs of repairs executed even during the Roman period. For in places boards have been found fastened over the original planks, the fashion of both being the same. Those repairs seem to have been carried out hastily, for in one place a mallet, employed probably to drive home the pegs, was found on the track, forgotten, no doubt, by the workmen. The local archæologists feel assured that they have here the *pontes longi* which were used A. D. 15, by the Roman commander, A. Cæcina, in his retreat from Germany to the Ems. — *London Times.*

DO RAILROAD LOCOMOTIVES CAUSE FLOODS AND STORMS? — A correspondent of the *Northwestern Railroader* advances a curious theory for the increasing prevalence of floods and rainstorms. He says that there are over 30,000 locomotives in use in North America, and estimates that from them alone over 53,000,000,000 cubic yards of vapor are sent into the atmosphere every week, to be returned in the form of rain, or over 7,000,000,000 cubic yards a day — "quite enough," he says, "to produce a good rainfall every twenty-four hours." Estimating the number of other non-condensing engines in use as eight times the number of locomotives, the total vapor thus projected into the air every week in this country amounts to more than 470,000,000,000 cubic yards. "Is this not," he asks, "sufficient for the floods of terror? Is there any reason to wonder why our storms are so damaging?" — *Age of Steel.*

A NEW STEAM BOILER. — "A boiler for the instantaneous generation of steam is the very newest thing in our line," said a leading manufacturer to a *Mail and Express* scientist the other day. "The apparatus consists of a thick wrought-iron tube of any convenient diameter, which is flattened at a temperature below the welding point, till its internal walls are almost in contact, a section of the tube showing only a straight line the thickness of a hair. The tube is then coiled into any convenient shape and is exposed to the direct heat of the furnace. Cold water being forced in at one end by a pump issues out from the other as steam, the pressure and dryness of which depend on the temperature of the tube." It is claimed that no furring or scaling up of the tube takes place, as the high velocity with which the steam passes through breaks up and carries along with it any deposit at the very instant of its formation. The largest boiler yet constructed on this plan has been a ten-horse-power one, and has proved so satisfactory that the system is about to be extended. The government has experts at work examining the system, expecting to adopt it for use in the construction of torpedo boats.

DEATH OF M. FELIX ROUQUET, ARCHITECT. — The French papers, announce the death of the able architect, M. Félix Rouquet, who was born at Châlon-sur-Saône in 1822. He took part with Ballu in the restoration of the church at St. Germain-l'Auxerrois, the Tour de St. Jacques de la Rouchine, the churches of St. Séverin, Ste. Clotilde, and La Trinité, Château de Chenonceaux, the Hôtel Carnavalet, and other buildings. He was the author of an excellent monograph on the Cathedral at Rheims, and one of the best architectural draughtsmen France has produced. He received a Medal of the Second Class at the *Salon* of 1874; another at the Exposition Universelle of 1878. — *Birmingham Post.*

S. J. PARKHILL & Co., Printers, Boston.

[1] From Chambers's "*Book of Days.*"

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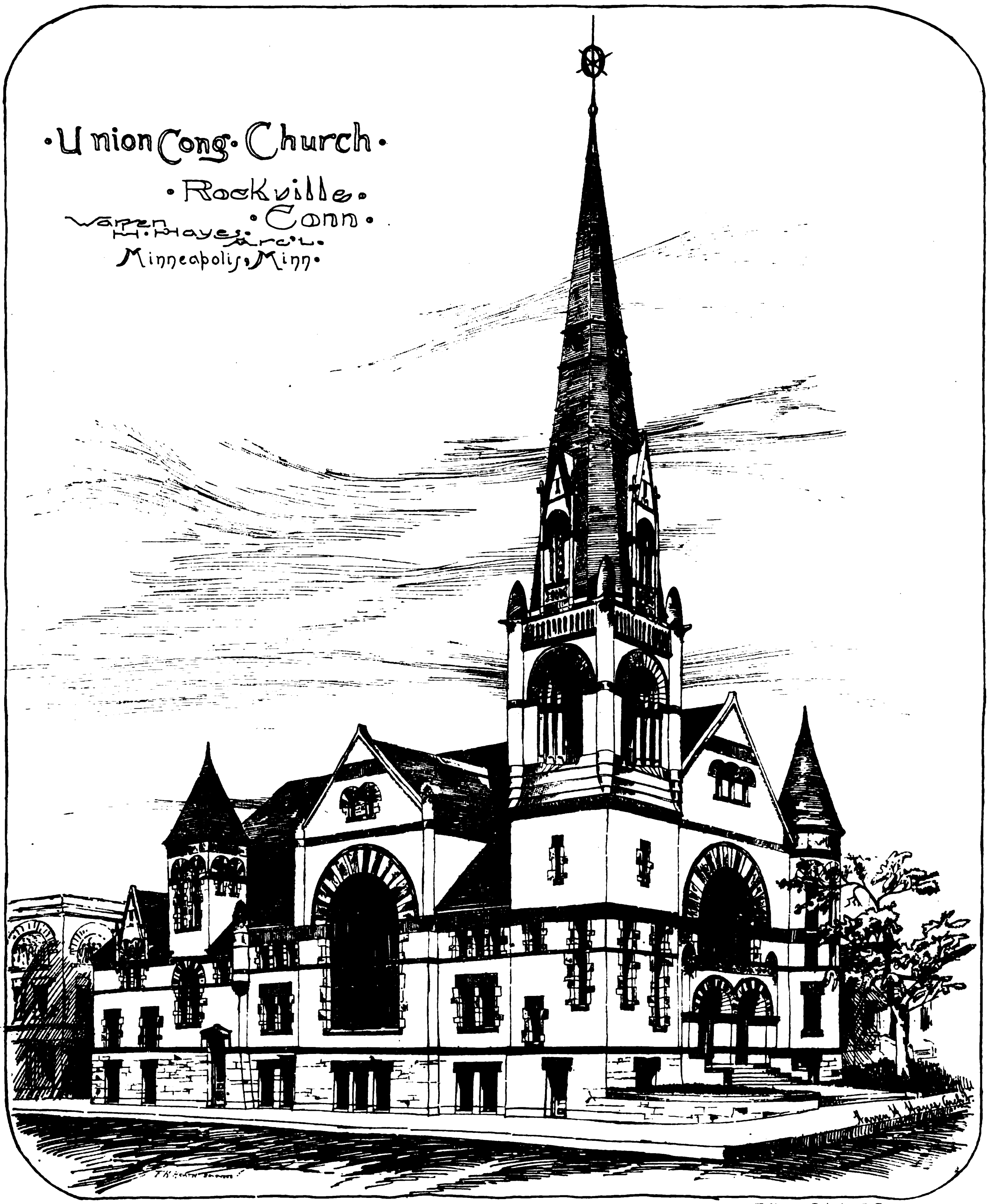

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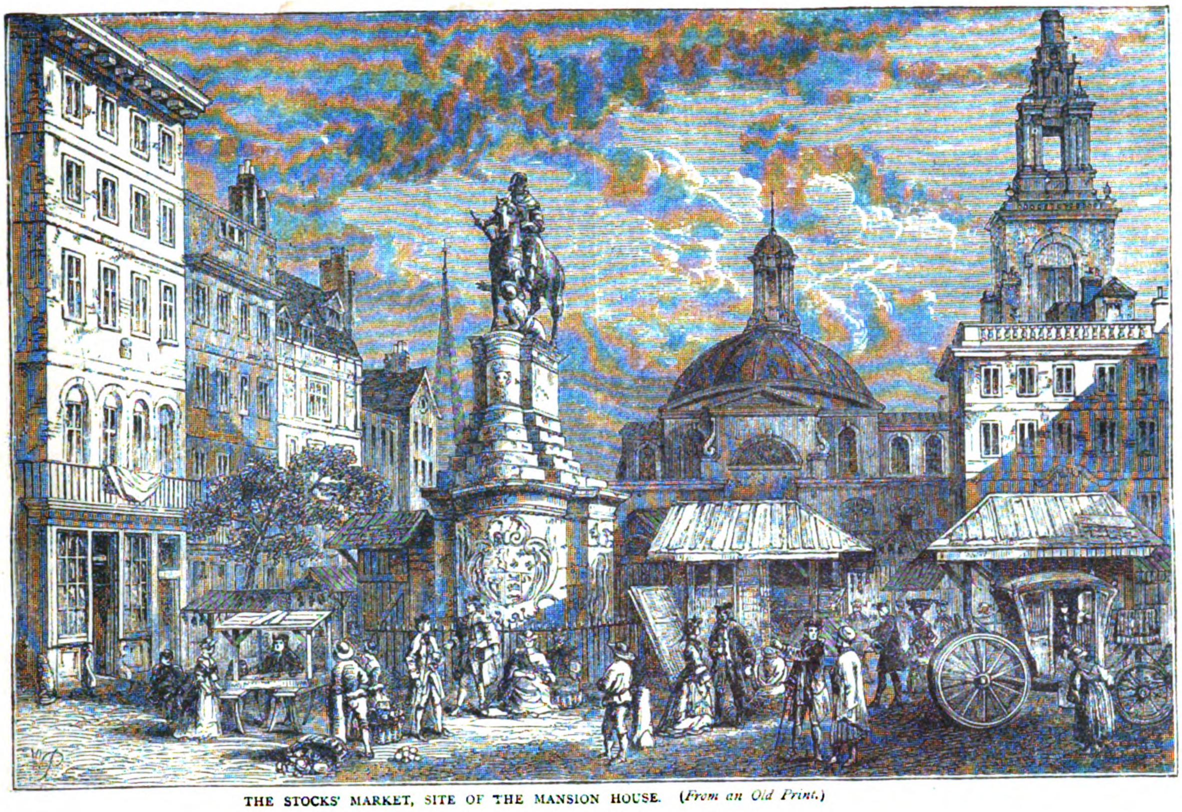
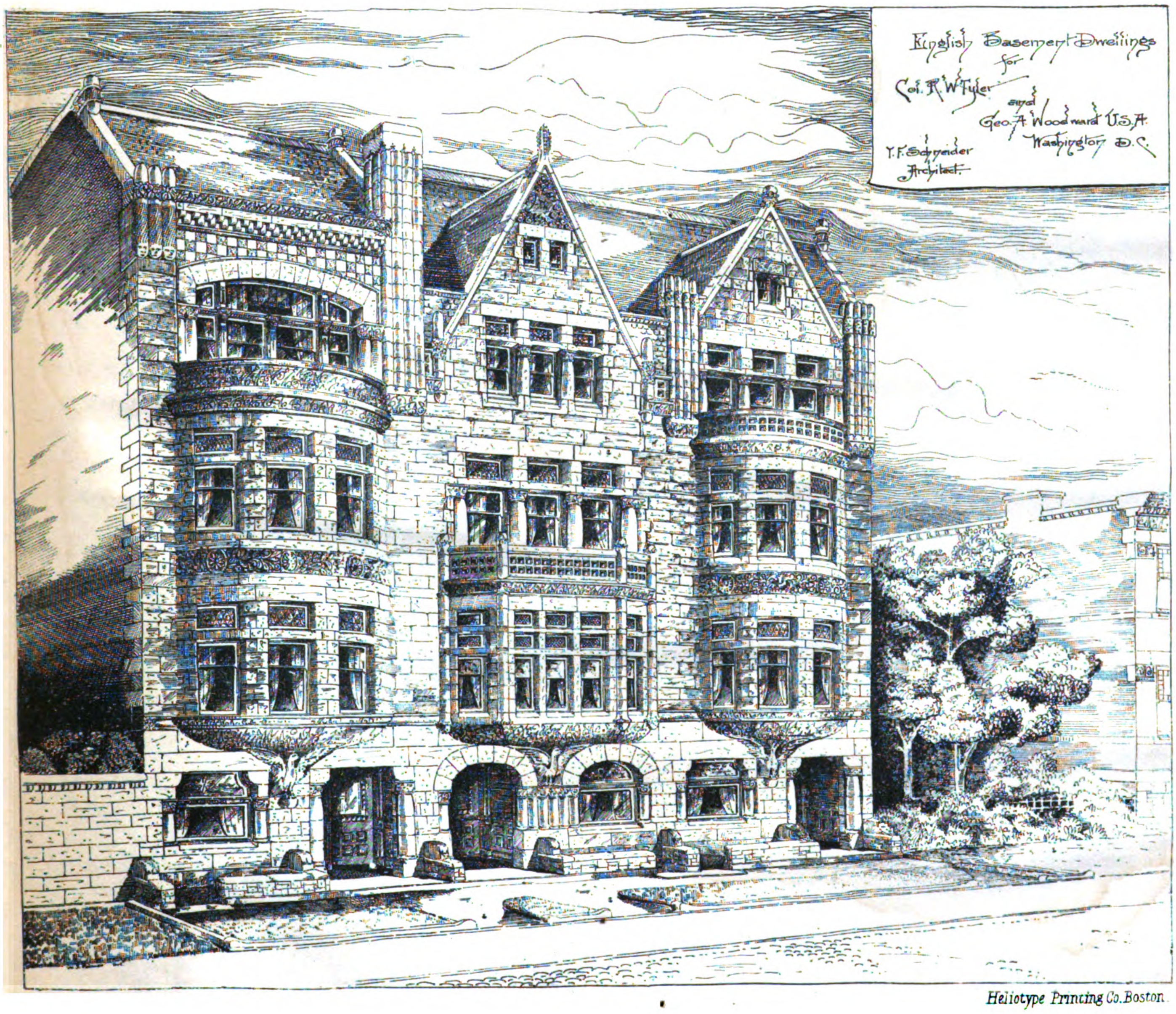


THE STOCKS' MARKET, SITE OF THE MANSION HOUSE. *(From an Old Print.)*



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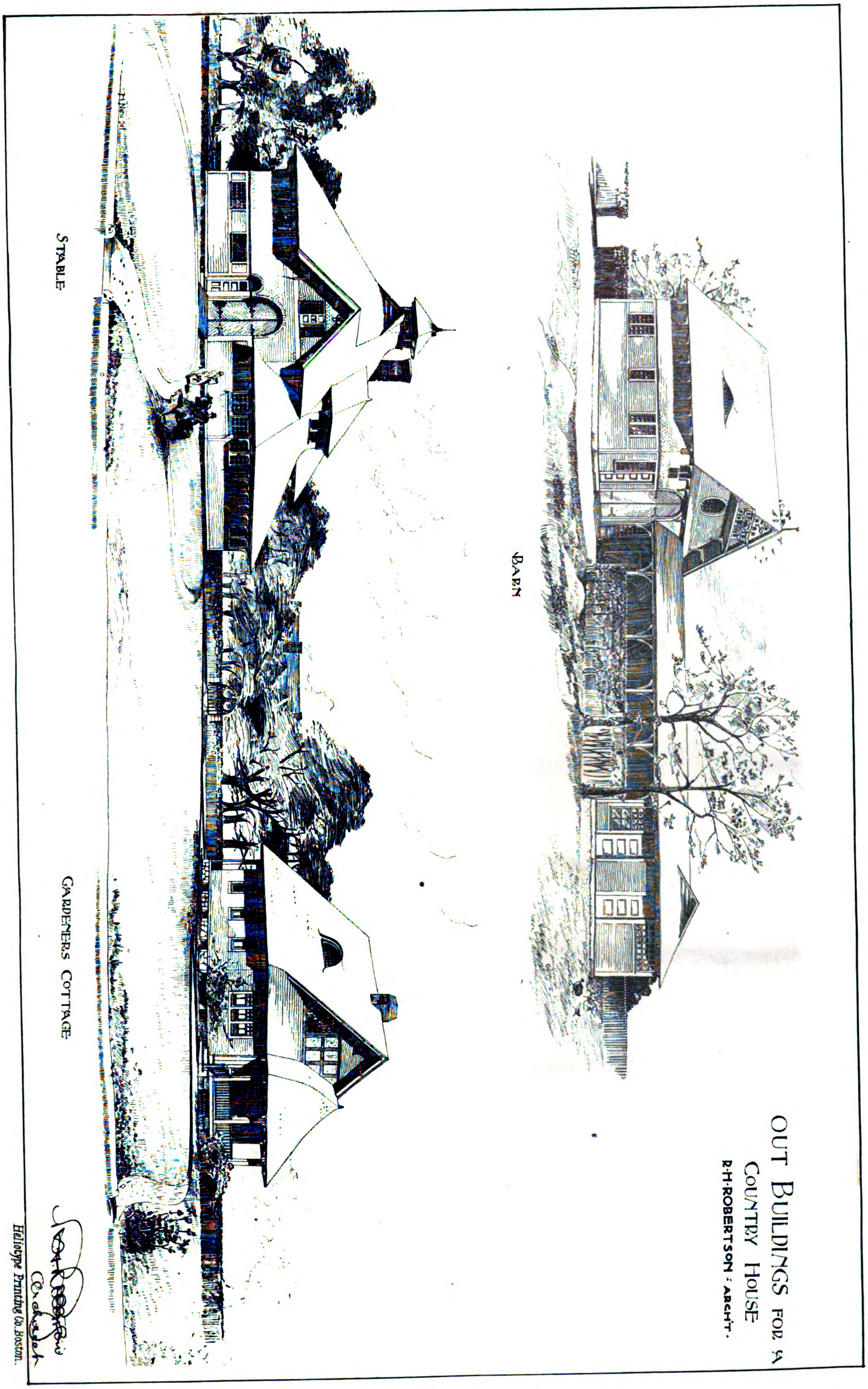

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House for F. H. Cloud Esq.
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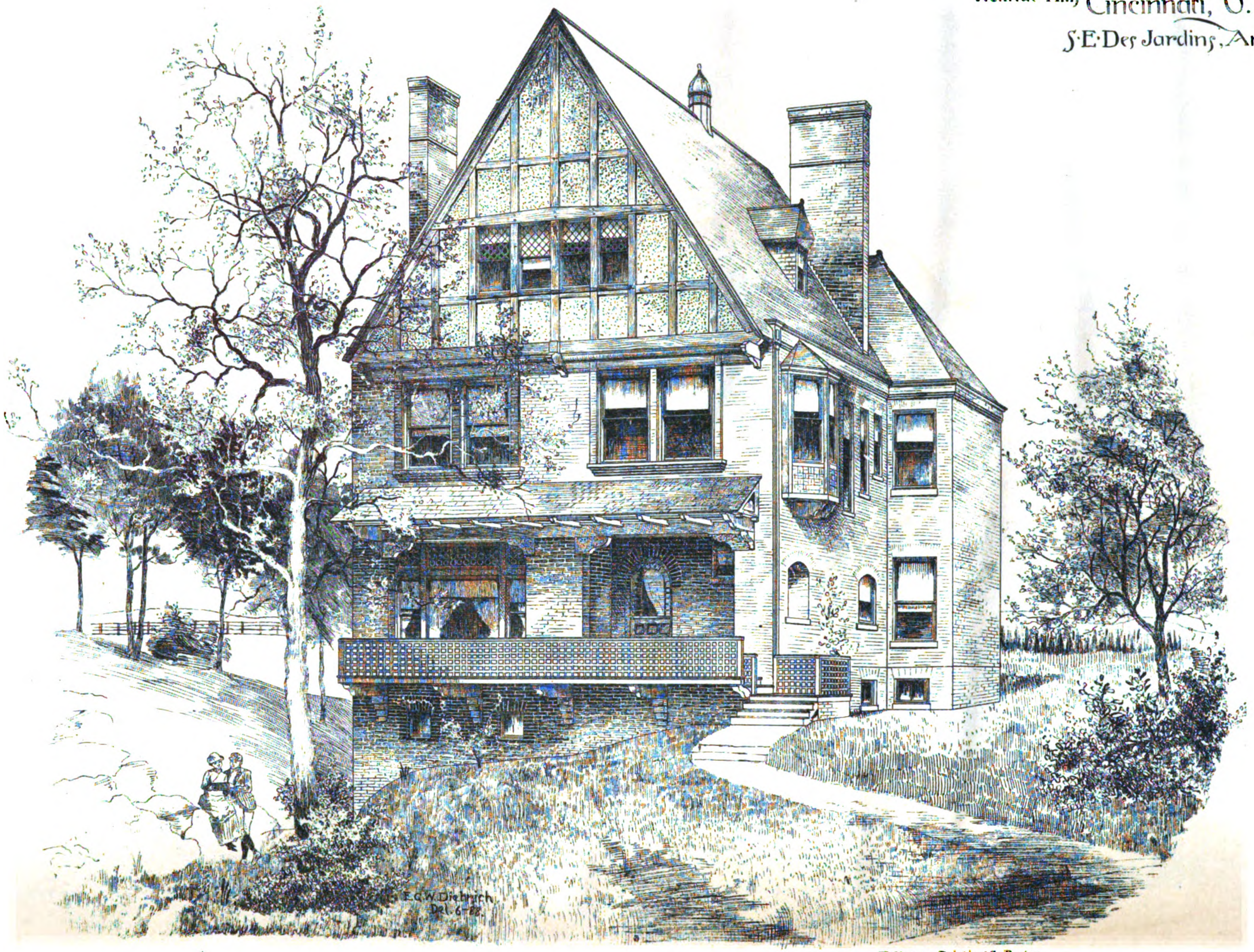

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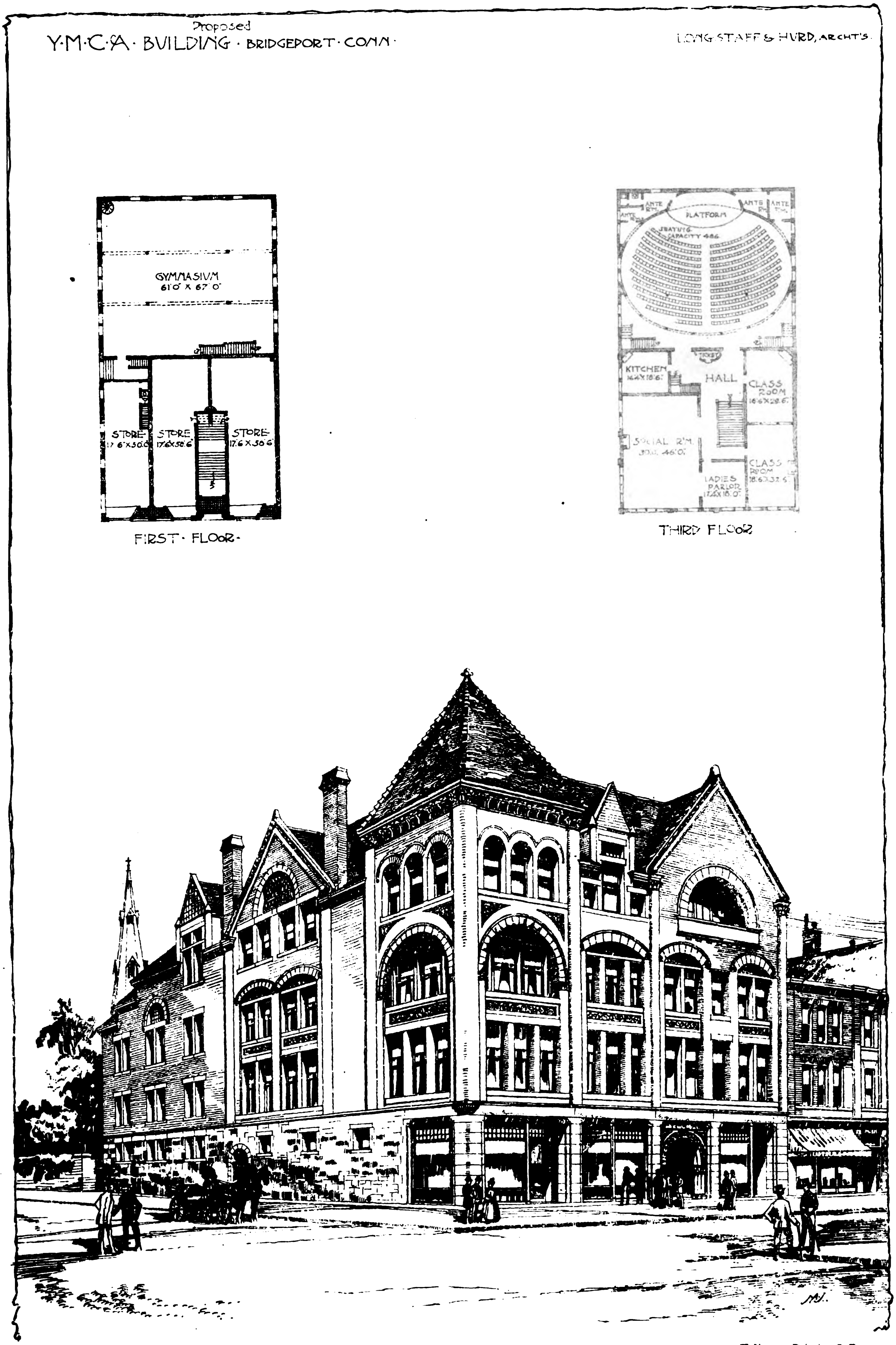

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AMERICAN ARCHITECT AND BUILDING NEWS, Nov. 10 1888 No. 672

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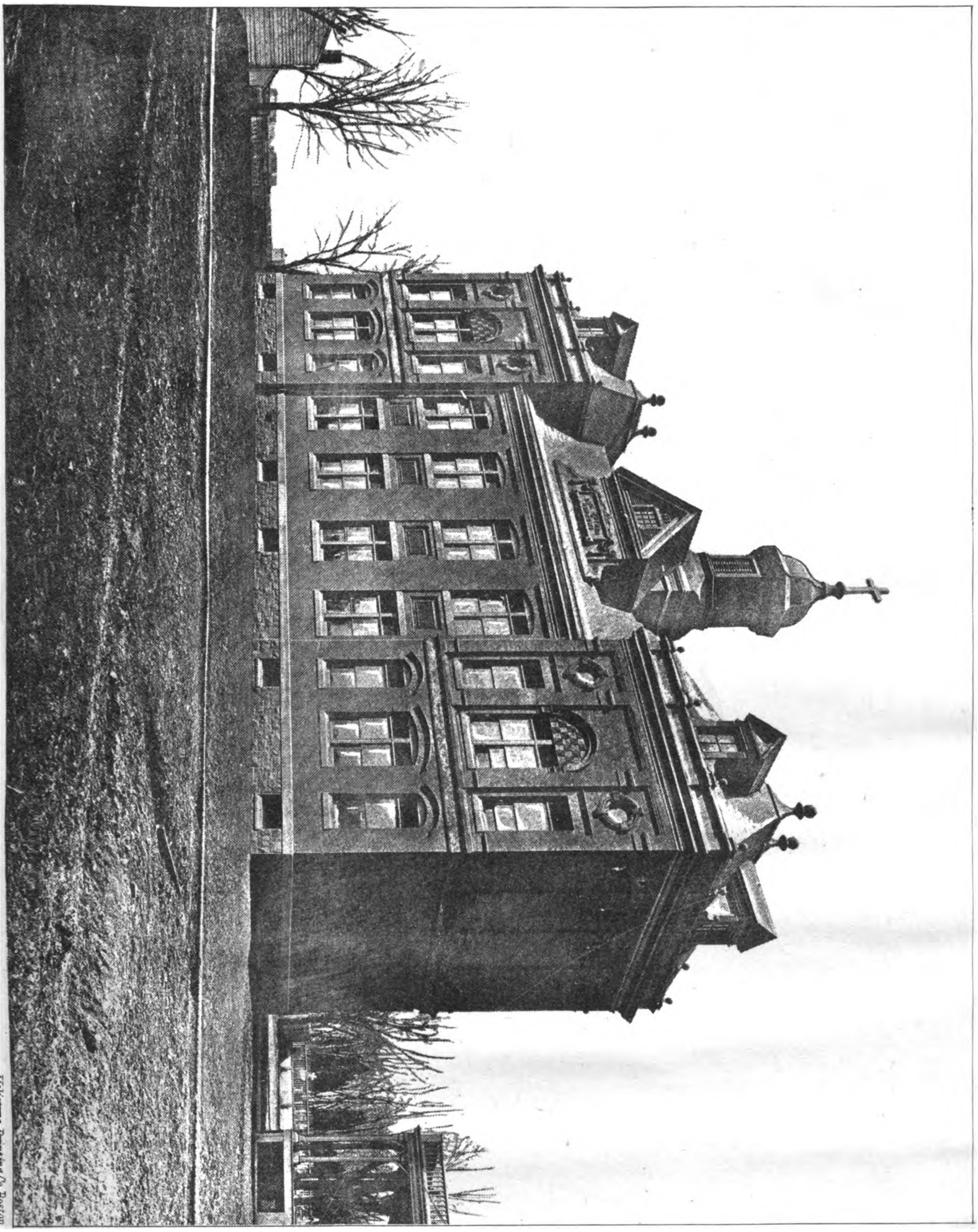

Our Mother of Sorrows Schoolhouse: Phila.
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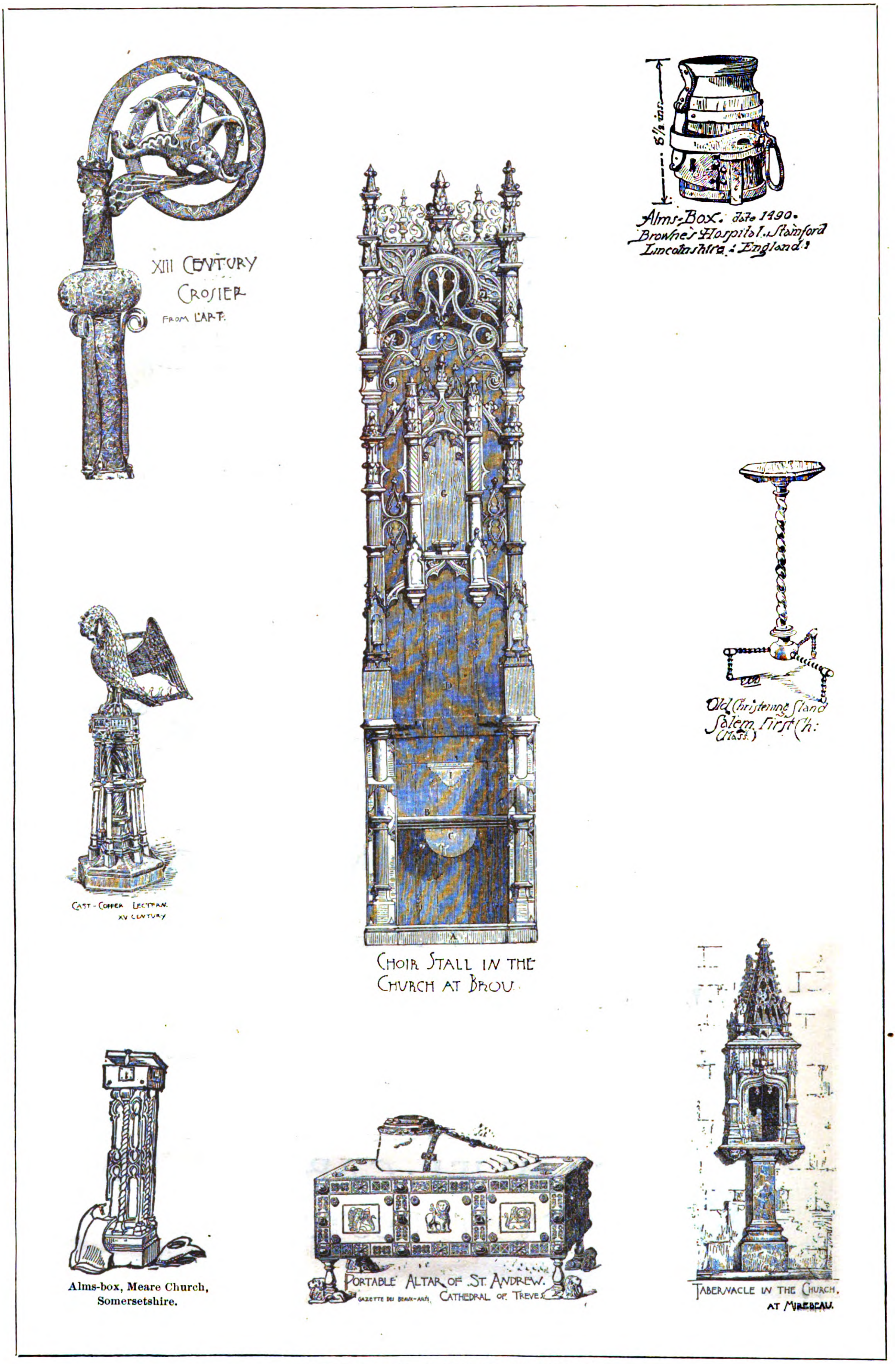

CHURCH FURNISHINGS.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIV. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 673.

NOVEMBER 17, 1888.

Entered at the Post-Office at Boston as second-class matter.

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THE *Engineering and Building Record* brings up a point, in answer to a correspondent, which is well worth discussing, if the discussion will elicit the results of the experience of architects or builders. The correspondent asks how much the lower half of a brick wall one hundred feet high will settle while the upper half is being built; and the editor, while calling attention to the importance of the question, mentions, as the only definite measurement which had come to his knowledge, that nine feet at the bottom of a high wall settled three-eighths of an inch during the completion of the building. We think most persons of experience would consider this a small settlement. Where a new building is constructed by the side of an old one, using the old wall as a party-wall, and erecting a new wall parallel with it to enclose the opposite side of the structure, the floor-beams, if laid level from the holes cut in the old wall to their places on the new one, would, when the house was finished, be lower at the end next the new wall than the other. It is usual with masons to allow a correction for this, laying the beams higher at the end on the new wall, so that when the weight has been added they will be found to have settled to a level. If we are not mistaken, the allowance made for this purpose is five-eighths of an inch for each story, where the new wall is of common brick, with joints of the ordinary thickness. This, of course, is only a rude approximation to the exact correction, as the settlement goes on continuously while the wall is in process of erection, and for some time afterward, but it answers a tolerably good purpose, and with different mortars, or different methods of bricklaying, the compression might be more or less. One thing which should not be forgotten, and which is, perhaps, more easily determined with accuracy than the compression of fresh mortar, is the settlement of old brickwork under a newly added load. All architects have seen old party-walls extended upward, and seen, also, that the old brickwork settles materially under the additional weight. We remember one instance where an old party-wall was lined up, and built upon from the top upward to a height of some sixty feet. The old brickwork settled, apparently throughout its whole extent, but the effect was naturally greatest at the top, where a movement of nearly two inches seemed to have taken place, dislocating the stone cornice and the upper window-dressings nearest to the party-wall, so that they had to be rebuilt. These walls were built with a large dose of cement in the mortar. How the effect would have been modified with more or less cement is an important question.

THE discussion of the dispute between Mr. E. R. Robson and the London School Board has called out a letter in the *Builder* from one of Mr. Robson's clerks-of-works, of a very different stamp from the individual whose description, as given by himself, we mentioned recently. The *Builder's* correspondent, Mr. Phillips, explains the matter of the staircase which was built with insufficient head-room, by saying that it was an ingenious device, or, rather, an adaptation of an old plan, for getting two staircases in the space of one, by providing a mezzanine at half the height of the story. He had himself carried out staircases of the same sort in others of Mr. Robson's school-houses successfully, the minimum headway being six feet and a half, but the ingenious person who "did not care to furnish other people with brains" seems to have got hopelessly muddled over the plans, and to have been too egotistical to conceive the possibility that the mistake might have been in himself, instead of the drawings. Besides the trouble with this, and possibly other incompetent clerks-of-works, Mr. Phillips says, what is well worth noting, that the practice adopted by the School Board of paying contractors every month enabled builders of little capital or credit to obtain contracts, which they carried out after the manner of their kind. In one case under his charge the proposed site of the school was partly occupied by a brick cottage, which, under the contract, was to be torn down, and the materials removed by the builder. Coming to the place late one forenoon from other buildings under his care, he found that the cottage, which the day before was intact, had disappeared. The foreman, on being asked how it was got away so quickly, answered, with many smiles, that "they had a lot of carts there early, and carted it all away." Mr. Phillips, who appears to have the tact of a born superintendent, thought there was something abnormal about the foreman's cheerfulness, and looked about with special care. A trench had been dug for the concrete footings of one of the walls, and this he found filled and nicely levelled up with fresh concrete. He ordered some of the concrete dug out, and discovered that it was only six inches deep, and that underneath lay what he calls "the grave of the old cottage," consisting of a mass of bricks, plaster and other rubbish, which, instead of being "carried off early in carts," had been simply dumped into the trench, previously prepared for it by daubing a little concrete over the bottom and sides, and covered with a layer of concrete over the top.

A QUESTION is sometimes raised as to the antiquity of the five per cent architect's fee, and it is interesting to know that it had been established by immemorial custom as early as the year 1800. In February of that year, the twelfth Pluviôse of the eighth year of the millennium ushered in by the French Revolution, the Conseil des Bâtiments Civils reported to the Minister of the Interior that it was "a custom which had always served as the rule, and which ought to determine the rulings of the courts in such matters," that the architect was properly entitled to five per cent on the cost for "making plans, directing the work (*conduite des ouvrages*), and examining and adjusting the accounts for ordinary buildings in Paris, but that for buildings at a greater distance than three miles from his residence double fees should be allowed, the architect paying his own travelling expenses"; and that if, "as sometimes happens, drawings or models were required which occasioned unusual expense, the value of these should be estimated and paid separately."

A NEW English trick is described in the *Builder*, against which some of our readers may be glad to be warned before it becomes acclimated in this country. As described by Mr. W. H. Bidlake, an architect who has been made a victim, the fraud is a simple one. The inventor of it, a man of about forty, with "a sandy moustache," whose "writing and spelling are emphatically bad," makes his appearance in a town and buys a lot of land. He then calls on some architect, whom he employs to make plans and specifications for a building on the lot, and to obtain tenders. These are procured, and a contract signed. The architect is particularly requested to have as much material as possible delivered on the ground ready for use, "to avoid obstructing the roadway." The work is begun under the contract, and pushed by the builder, to whom, however, the speculator thinks it imprudent to make any payments until

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the roof is on. By the time the building has reached this stage, the proprietor has made arrangements for placing a large mortgage on the building and ground, and as soon as the money is in his possession he disappears with it, leaving the mortgagee to take possession of the estate, and the builder and architect to console themselves with the reflection that they have gained a valuable experience in return for their time and money. Mr. Bidlake says that the individual whom he describes has carried out similar schemes in at least six different towns, to his knowledge.

THE demolition of the gigantic steamship, the "*Great Eastern*," which is now nearly complete, recalls some of the singular hopes and disappointments which attended the early adventures of that wonder of our boyhood. Although several Atlantic steamships now in service nearly approach the "*Great Eastern's*" dimensions, none have yet reached them, and thirty years ago she was one of the wonders of the world. At that time emigration to Australia was increasing rapidly, and it seemed as if a ship large enough to take out a whole colony at once would be popular and profitable. With this idea the "*Great Eastern*" was designed, for a company formed expressly to build and use her, by the younger Brunel. For some reason, the estimates of cost which had been made proved very inadequate, and the company which owned her was ruined before her completion, winding up its affairs in bankruptcy, after spending eight million dollars on a ship still unfinished. After much trouble, money was raised to complete and equip the vessel; but she was unfortunate from the first. On one of her earliest trial trips a serious accident took place on board, and her enormous bulk made it difficult to manage her, or even to enter most harbors. The idea of sending her regularly to Australia was abandoned, and she was tried on the route between Liverpool and New York. She made one or two trips successfully, and the spaciousness of her decks and saloons would have made her popular with travellers, if it were not that her size made it difficult to get her over the bars, both at Sandy Hook and at the mouth of the Mersey, while, if we recollect rightly, she could not be brought to any pier in New York, but had to anchor in the Hudson River, off Twenty-third Street, and transfer her passengers to tenders. After it was found unprofitable to use her as an Atlantic liner, she remained idle for a time, until it occurred to some one that her immense hull would be well adapted for storing the coils of telegraph cables, which, after the success of the first Atlantic cable, were being laid all over the world. The earlier Atlantic cables, in default of vessels large enough to carry the whole of a rope three thousand miles long, were laid from two ships, each carrying half the line, and moving from mid-ocean in opposite directions. The objection to this, aside from the expense of the double equipment of ships, instruments and apparatus, and electricians, lay in the danger that the two vessels might drift or be blown asunder, so as to break the cable. This happened several times, and the opportunity for doing the whole work with a single ship like the "*Great Eastern*" seemed very advantageous. The demand for such service was, however, only temporary, and the huge vessel was soon laid up in idleness again. After resting for several years, she was sold, at a disastrous sacrifice, to be used in carrying coal from the mining region to London. Her unwieldly size seems, however, to have interfered with this sort of service, and she was soon put out of commission again, and moored in Liverpool harbor, where she was shown as a curiosity, and served to attract many visitors. The income derived from this source was too small to pay for the care of the ship, and she was finally sold at auction, some six or eight months ago, as old junk, with the understanding that she must be broken up as soon as possible, and got out of the way. Some enterprising contractors were bold enough to bid a hundred thousand dollars for her, and her plates will soon be scattered through the English rolling mills whence they came.

A CURIOUS illustration of the progress which has been made in naval design is furnished by the fact that her dimensions and construction were such that she could not be adapted to modern marine machinery. Unlike the great ships of the present day, which measure in length, as a rule, ten times their breadth, the "*Great Eastern*" was eighty-three feet wide, with a length of six hundred and seventy-nine feet. She was originally fitted with side-wheels, as well as a screw. The latter was driven by an engine of sixteen hundred horse-power, while another engine of one thousand horse-power moved the side-wheels. The two sets of engines together exerted only twenty-six hundred horse-power, a force which would be thought in these days very inadequate to the propulsion of such a mass, while, owing to the wastefulness of the old marine engines, her consumption of coal was three hundred tons per day. It is true that such ships as the "*Etruria*" and "*Umbria*" burn very much more than this, while at high speed; but their triple-expansion engines enable them to get far more work out of a ton of coal than was possible with the "*Great Eastern's*" engines, while the comparatively light construction of the latter vessel made it impracticable to fit her up with the powerful machinery which serves to drive the strong and thoroughly braced steamers of the present day through the water.

THE daily papers interest themselves a good deal in the twenty-eight-story building which it is proposed to erect in Minneapolis. We do not know whether the scheme is a serious one, but, if so, we are decidedly inclined to agree with the persons who believe that such inordinately lofty structures are not likely to prove profitable to their owners. There is no doubt that, with care and skill, a very lofty office-building or apartment-house may be so constructed as to be safe against ordinary sources of danger, but it is also certain that very few buildings of the kind are so constructed, and nearly all the twelve or fifteen story structures that we know have, within a few years after their erection, shown signs of movements which must inevitably lead to speedy deterioration, if not total ruin. In most cases, the cracking and twisting, which the observant eye readily detects, appear to come from unequal settlement in different portions of the walls, and in the substance of the walls themselves, and such unequal settlements would be increased by carrying the masonry to a greater height, unless the usual system of building were modified, by abandoning close jointed facings to rubble or rough brick walls, and constructing all exterior and division walls of block-stone, of nearly the same dimensions throughout, and laid with mortar joints of uniform thickness. This would add considerably to the cost of the building, and increase the amount which must be charged for rents in it. Moreover, even if properly and safely constructed, such a building would have many objections, from which more modest structures are exempt. We ought never to forget that we live in a country where earthquakes are tolerably frequent. Probably each one of our readers has felt one or more shocks, strong enough, perhaps, to shake bricks off a chimney-top, and the effect of such shocks at the top of a building three hundred feet high would be so vigorous as to frighten the tenants of the upper stories, if nothing worse. More than fifty years ago there was an epidemic of lofty buildings in New York, and, although elevators were then unknown, six, seven or eight stories were not considered too much to place over the valuable lots in the lower part of the city. Between 1830 and 1840 some earthquake shocks were felt in New York, and the owners of the taller buildings made haste to cut off the upper stories and reduce them to more stable proportions. What would be the effect of a lively earthquake shock on the tenants of a twenty-eight-story building may be imagined, and the fall of a person from an upper window, or any one of a dozen probable accidents, would depopulate all the structures over a certain height in Minneapolis, or in other town that might follow its example.

EVERY engineer knows something of the cheap coating for steam-pipes, made of sour flour and plaster-of-Paris, mixed, allowed to ferment a little, and spread on the hot pipes to bake, which is often used here. This, we should think, might tend to corrode the iron pipes, and a useful substitute may be found in a sort of sawdust pudding, which has long been employed in the great pen manufactory of Blanzy, Poure & Company, at Boulogne, and is described in the *Revue Industrielle*. The dough is made by mixing flour paste and sawdust into a compact mass. If the pipes are of iron, clean, and free from grease, it may be applied directly, to the depth of an inch. A mixture of two parts wheat to one of rye flour gives the best paste, and, when prepared with fine sawdust, freed by sifting from lumps, it adheres perfectly. For brass pipes a wash of clay, mixed with water, should be applied before putting on the paste, or twine may be wrapped around the pipe. The paste should be put on in two or three layers, each being allowed to dry before adding the next, and when all is dry, two or three coats of coal tar, put on with a brush, will prevent deterioration from dampness.

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BUILDERS' HARDWARE.[1] — XII.

PULLEYS.

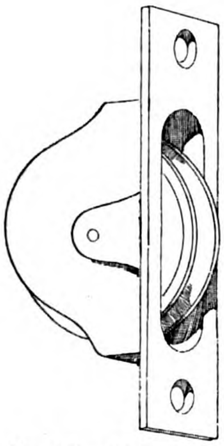

Fig. 162. Ordinary Axle-pulley.

ALMOST the only forms of pulley used by builders are those which are employed for double-hanging windows. These are made with cast-iron frames for the cheaper styles of work, or frames of malleable iron for a better class of goods; while some manufacturers use wrought-iron entirely. The wheels are usually made of cast-iron, with a groove shaped to receive the sash-cord or chain. The pulley is fitted in a mortise cut into the face of the hanging-style of the window-frame, and the part visible, or the face, is made of almost any material, but most often of bronzed, nickel-plated, painted or japanned iron. The commonest form is bronzed iron. The axles of the wheels are of steel or gun-metal, and the wheels themselves in the better class of goods are turned to accurate dimensions, though some cheaper grades are simply cast and polished. Some manufacturers finish pulleys with plain or ornamented bronze faces, in which case the face is made of a separate piece of metal, riveted to the iron frame of the pulley. There are also in the market, a few fine grades of pulleys made with brass wheels and cast-brass frames. This is, however, a needless expense, and such pulleys are used more in connection with furniture than with building.

The essential qualities of a good pulley-wheel, are simply that it shall run lightly, smoothly and easily. There should be a broad hub on the axle in order to prevent the flanges from jarring or rattling against the pulley frame, and the wheels selected should be of such a size that when the face-plate is mortised-in flush with the face of the hanging-style, the inner edge of the wheel will be over the centre of the box, so that sash-weights will not strike against the frame when raised or lowered.

Sash-pulleys are usually made in five sizes: $1\frac{3}{4}$ inch, 2, $2\frac{1}{4}$, $2\frac{1}{2}$ and 3 inches, the size referring to the diameter of the wheel. The two-inch wheel is sufficiently large for most cases, but for heavy, plate-glass windows larger sizes are used, though the chief advantage of a large pulley is not so much that it will wear better, but that it will throw the sash-cord farther away from the hanging-style, and so permit of larger sash-weights. When the expense is not an item to be considered in the selection, it is well to employ some form of anti-friction, ball or pin bearing pulley for all sash weighing over fifty pounds. A poor pulley will soon wear loose so as to rattle on the axle. If anti-friction wheels are not advisable, the next best form is one with a large gun-metal axle. Some compositions of phosphor-bronze would seem to be peculiarly well suited for pulley axles, though not at present in the market to any extent.

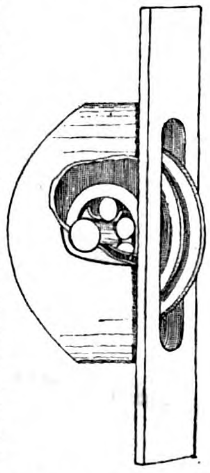

Fig. 163. Anti-friction Sash-pulley. Moore Mfg. Co.

There are a great many varieties of sash-pulleys, though the differences are so slight that a few examples will serve to illustrate the whole. Figure 162 is a fair type of the ordinary axle-pulley, and Figure 163 is a type of the best form of anti-friction sash-pulley. All of the most commonly used forms of sash-pulleys are on essentially one or the other of these lines.

The only important deviations from the common types of sash-pulleys have been made with a view to reducing the amount of labor required to properly set the fixtures in the window frames. It should be said that none of the patent forms have thus far met with either very wide sales or general approval, which would seem to indicate that the common form answers pretty fully all the requirements of the case. There are, however, a few styles which have met with considerable favor in the market, and which will serve to give an idea of the lines the attempted improvements have followed.

Figure 164 illustrates a form known as the "Empire" sash-pulley, in which the case is corrugated horizontally so that it will exactly fit into a series of holes bored into the frame with an auger or bit of standard size, a great reduction in the labor of mortising thus being effected. The advantages claimed for it are that it cuts away less of the frame than any other pulley, is held more securely, does not require any screws, and can be inserted much more readily and quickly than any other kind. It is claimed that these pulleys can be fitted to the window frames at the rate of sixty per hour.

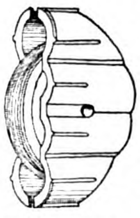

Fig. 164. Empire Sash-pulley. Empire Portable Forge Co.

A pulley requiring even less work in setting, though somewhat more complicated in construction, is shown by Figure 165. This consists of two small wheels set in a cylindrical case, and requiring no more labor to fit in place than is involved in the boring of a single hole. Shoulders or flanges at top and bottom of the case serve to plumb the pulley properly, and kept it from twisting. It is claimed that this pulley will hold its position quite as well as any other form, though it would seem more apt to work loose by reason of the leverage of the weight over the inner wheel, than the ordinary form.

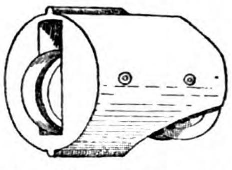

Fig. 165. Corey's two-wheel Sash-pulley. J. B. Johnston.

Another style of pulley which does not avoid cutting the mortise on the frame, but saves somewhat in the screws, and has a finer appearance than either the "Empire" or the "Corey," is shown by Figure 166. In this pulley the face-plate and frame are cast together, and the frame is made with a wide shoulder or flange at the bottom, which is cast on a bevel, so that when placed in position in the rebate, the pulley cannot slip down or out, by reason of the bevel wedging into the mortise. A single screw at the top of the pulley holds it securely in place; but it will be seen that it does not depend upon the screw for its stability. With an ordinary pulley, the heavier the sash the greater is the possibility of the wheel being forced out from its mortise, whereas, with the "Norris" pulley, the greater the load, the more securely is it wedged in place. Another obvious advantage is that it requires just half the quantity of screws and amount of labor to set this pulley as it does the ordinary pulley; and it is said that the carpenters who have used this, have liked it very much. The labor of mortising is slightly more than for the ordinary form, but the company controlling the patent also manufactures a mortising-machine specially adapted to this kind of work, by which the labor is greatly reduced. Aside from the labor of mortising, the only possible objection to this sash-pulley seems to be that it would require a pretty heavy hanging-style to the window frame, and would cut away the wood a good deal, the bevelled flange being three-quarters of an inch through for an ordinary sized pulley. This patent is manufactured in the same sizes and styles as the ordinary pulleys, including those with flat-grooved wheels for sash-chains.

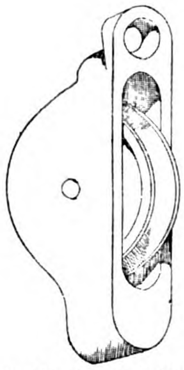

Fig. 166. Norris Pulley. C. Sidney Norris & Co.

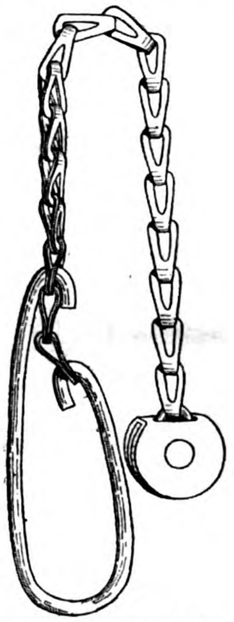

Fig. 167. Single Sash-chain. Smith & Egge Mfg. Co.

The following table gives the average retail prices of the principal marketable varieties of ordinary sash-pulley wheels.

[1] Continued from page 219, No. 672.

TABLE OF SASH-PULLEYS.—PRICES PER DOZEN.

Description.	1¾ in.	2 in.	2¼ in.	2½ in.
Painted iron, cast wheel	$ .25	$ .30		
Bronzed iron, steel axle, cast wheel	.50	.65	$ .70	
Bronzed iron, steel axle, turned wheel	—	.90	1.10	$1.35
Bronzed iron, anti-friction steel axle, turned wheel			1.75	2.00
Polished brass face, anti-friction steel axle, turned brass wheel			5.50	6.25
Brass or bronze face, steel axle, polished iron wheel		1.35	1.75	
Corey's fine bronzed iron, steel axle, turned wheel	.60	.75		
Empire fine bronzed iron, polished face and wheel		.45		
Norris's fine bronzed iron, polished face and wheel	.49	.50	1.10	
Smith & Egge, polished iron, flat grooved, turned wheel		2.25		2.65
Smith & Egge, polished iron, 3-inch double grooved wheel........$ 8.00				
Smith & Egge, polished iron, 4-inch double grooved wheel........13.50				

SASH-CHAINS AND WEIGHTS.

In the better-class of buildings it is usual to hang all sashes weighing over forty pounds with some form of sash-chain; indeed, except for the expense, it would often be well to use nothing but chains, especially in buildings of a public character where the windows are apt to be moved with little care. The ordinary cords used for windows are liable to wear out and break, and experience has often shown that a good sash-chain will outwear enough of the ordinary sash-cord to make it more than worth while to use the stronger material.

The sash-chain, which appears to meet with the greatest favor in the Eastern market, is that which is made by the Smith & Egge Manufacturing Company. The form of this chain is illustrated by Figure 167. It is a species of flat-link chain, the form being the same as the well-known plumbers' safety-link, which has been in use for various purposes for a great many years. Smith & Egge adopted this form as best adapted for window-chains, and they have perfected special machinery which does away almost entirely with handwork, and enables them to produce the chain at marketable prices and of a superior quality. The chain is made with a great deal of care, each link being automatically tested as it leaves the machine. The metal preferably employed for this purpose is a bronze composition specially prepared by the manufacturers, designated as "giant metal," which is, in appearance, very much like pure copper, but is tougher and harder. A cheaper composition is also used, which is known as "red metal," and steel chains are manufactured to a certain extent, though the giant-metal chains are the best in every respect. The best giant-metal chains will sustain loads as high as 700 pounds. The red-metal chains are manufactured to sustain from 380 to 500 pounds. Steel chains are made in three grades: one capable of sustaining from 125 to 175 pounds; another from 400 to 450; and the strongest from 600 to 700 pounds.

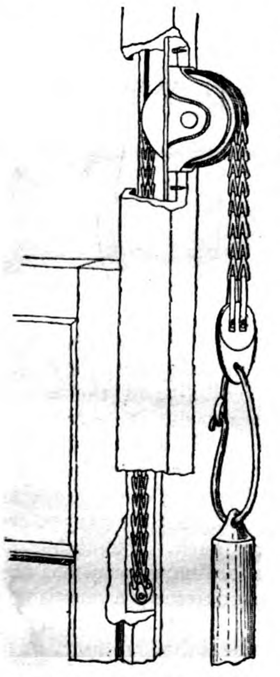

Fig. 168. Double Sash-chain. Smith & Egge Mfg. Co.

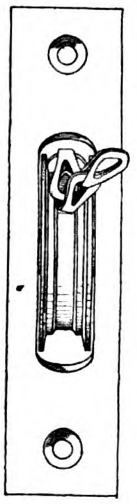

Fig. 169. Grooved Sash-chain Pulley. Smith & Egge Mfg. Co.

Instead of one chain, it is often more desirable to use a double chain for very heavy windows, as shown by Figure 168. This figure, and Figure 167, also show the manner in which the chain is attached to the sash and to the weights.

Pulleys intended for use, with sash-chains, require a different groove from that usual where rope is employed. The Smith & Egge Manufacturing Company has a special form of pulley intended to go with their goods, Figure 169. For convenience this pulley has been listed with the others in the preceding table of prices, together with one or two different makes of flat grooved-pulleys which would answer for the purpose equally well.

What has been said of the Smith & Egge chains applies equally well to the "Champion" sash-chains, manufactured by Thomas Morton, which have the same shape of link, though the sash and weight fastenings are slightly different. The "champion" metal is a bronze composition probably not differing essentially from the giant or the red metal. Thomas Morton, however, manufactures another form of sash-chain with quite a different link, which is shown by Figure 170. This is known as the cable-chain, and is a very strong, durable form, never twisting or kinking. The sash attachment used with this chain is very simple and efficient, consisting of a short half cylinder with a slot cut down from the top, wide enough at the bottom to admit a link of the chain, but narrowing at the top so as to prevent the swelling at the link-joint from passing through. The same sort of slot is cut in the weight-hook to hold the other end of the chain.

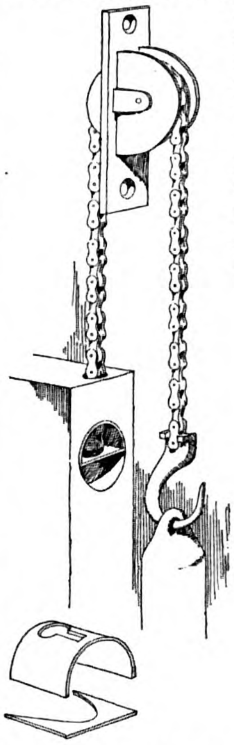

Fig. 170. Cable Sash-chain. Thomas Morton.

Fig. 171. Solid Link Sash-chain. Solid Link Sash-chain Co.

The cable-chains are usually made with alternately two and three pieces to each link, joined by a pin passing through the five thicknesses. For the lightest work the pieces are arranged two and two. The cables are made of either copper or steel, and vary in strength from a size for a thirty-pound sash to one capable of sustaining a door weighing 1,500 pounds.

There seems to be but one other form of sash-chain at present in the market. It is known as the "Solid Link" chain. It consists of a compound link on much the same principle as the Smith & Egge chain, but made double and with rather finer brass or bronze wire, so that the sash-chain is nearly as flexible as ordinary sash-cord, and can be bent or twisted in all directions without knotting or kinking, a quality which the Smith & Egge chain does not possess. The "Solid Link" chain can even be tied into a knot without kinking. Figure 171 will give an idea of the construction of the link. This form of

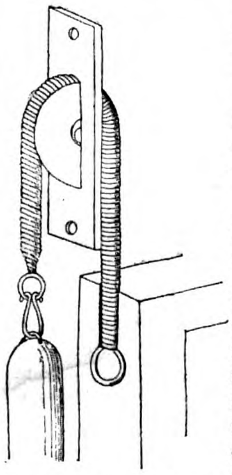

Fig. 172. Acme Sash-cord. Coiled Wire-belting Co.

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sash-chain requires no special pulley, but will run over an ordinary grooved-wheel.

An entirely different kind of sash-cord is shown by Figure 172. This consists of a steel wire spring so closely and strongly coiled as to have the resistance necessary to sustain any sash weighing sixty pounds or less. It has a stretching-capacity of only about five per cent. It enables the sash to rest easily and lightly on the pulleys, and enables it to be raised or lowered with half the effort required with rope sash-cord. It is fastened at one end to the sash by an eye or ring, and to the weight in the manner shown by the figure.

The following table gives the average, comparative, retail prices per foot of the various makes and sizes of sash-chains:

TABLE OF SASH-CHAINS. — PRICES IN CENTS.

Description of chain.	For sashes or doors weighing.											
	15 lbs.	30 lbs.	40 lbs.	75 lbs.	100 lbs.	125 lbs.	150 lbs.	250 lbs.	400 lbs.	800 lbs.	1000 lbs.	1500 lbs.
Smith & Egge's plumbers' link, Giant-metal.... ...		5	6.5	8		10						
Smith & Egge's plumbers' link, Red-metal.........	3.5	5	6									
Smith & Egge's plumbers' link, steel..............	2.5	3.5		5								
Smith & Egge's plumbers' link, steel, black enamelled.....................	3	4		5.5								
Morton's plumbers' link, Champion-metal	3.5	3.5		4.1	4.9	6						
Morton's plumbers' link, steel....................				3.5	4.1							
Morton's cable-chain, copper		8		7.8	9.6		11.2	13.6	18.4			
Morton's cable-chain, steel.....................				7.2	8		9.6	11.2	13.6	17.6	20	28
Solid link chain[1], brass....					14		22					
Solid link chain[1], silver-plated..................					16		24					
Acme sash-cord...........	3	4	5	6								

[1] There are but two sizes of solid link chain. They are tested by the makers at 200 lbs. and 300 lbs. before leaving the factory.

[To be continued.]

KINGSTON. — MONTREAL. — CANADIAN PACIFIC R. R. DEPOT. — GRAND TRUNK R. R. DEPOT. — ST. ALBAN'S CATHEDRAL, TORONTO. — CHAIR OF ARCHITECTURE. — ST. JAMES'S CATHEDRAL. — PARLIAMENT BUILDINGS. — COMPETITIONS. — CANADIAN ARCHITECT AND BUILDER.

KINGSTON is a pleasant, lively little city of 17,000 inhabitants, situated at the outlet of Lake Ontario — the beginning of the River St. Lawrence — exactly at the angle, thus having an easterly as well as a southerly aspect. Its nickname is the "Limestone City," from its stone, and it is generally considered an "aristocratic" place. Naturally it is a port of some importance; its position and the advantage taken of it for the development of its interests, the substantial and business-like appearance, from the abundant supply of local building stone, all help to make it a thriving place and one which must, as time goes on, greatly increase in size and importance. It is very English and reminds one strikingly of an English country town or small cathedral city; the mixture of the classes of dwellings, frame, brick or stone, all jumbled up together, here and there a church, and a few hotels, one or two of which might correspond with the coaching-houses of sixty years ago, its unpretentious shops and its river — always an accompaniment of a cathedral town — all these would lead an Englishman to expect to see the lofty spires or solid tower of a glorious Gothic pile rising high above all surroundings. But here he would be doomed to disappointment. Although a cathedral city in truth, the Classic structure that does duty for the absent Gothic church is certainly not worthy of the honor of being *the* church of the diocese. However, this is St. George's Cathedral — the Bishop's seat — with a portico of four Doric columns, raised on a flight of half-a-dozen steps, supporting a pediment above which rises a stumpy cupola, with prominent bright green Venetian blinds as louvres. The church was erected some fifty years ago, and some of its details are evidently from some good model: the interior has four fine columns mounted on questionable pedestals, but the moulded bases, the Ionic caps and the entasis of the shafts are decidedly good. Their proportions are lost owing to the hideous yellow-fronted galleries on three sides. The ceiling above a nicely proportioned central cornice is vaulted in lath and plaster, semi-circular with diagonal groins, the nave walls being carried up blank. The church, or rather the nave, has an apsidal termination, also lath and plaster, into which some other barbarian has introduced a large colored window of the usual character of inartistic memorial productions. Happily the congregation with an active rector at their head are alive to their heathenness, and contemplate extensive alterations, with the intention of improving on and enlarging their church and raising the whole tone of the service.

The presence of the military helps to keep Kingston lively; the Military College and the fortifications of the place giving it a war-like look. The Government recognizing the importance of Kingston as a port is allowing grants of money for the construction of a dry-dock and other additions to its facilities for business.

The great buildings of Montreal are rapidly progressing, efforts being made in each case to get as much done as possible before the settling down of the cold weather. The winter in Montreal is certainly no joke to the building trade: the first snow always falls in October and the last usually in April. It is not till the 14th of June sometimes that the new bricks are ready for sending out. Brick dwellings have been erected there all through the winter and in very severe ones, too, without any apparent harm, and really unless this is done, the "building season" is reduced to four or five months. This year the first snow-fall was early and great. Five and eight-tenths inches was registered on October 9, and it is said that so severe a fall has not been known for the last twenty-six years. Six inches were recorded October 26, 1862. I have measured 3″ and 4″ falls within the last few years for the first of the season.

The immense pile of buildings forming the new Canadian Pacific Railway depot is to be completed and inhabited this month (November). The cost of this building is in the neighborhood of two million dollars, which includes the railway station. This is the West-end depot, the acquiring properties for which and its approaches have footed up a long way into the seven figures. It has been a tremendous undertaking but the whole thing has been done within the last eighteen months or so. Negotiations for the appropriation of land for the other end of the line, its new entrance into Toronto, are proceeding and are almost completed. What with new bridges, particularly the one over the St. Lawrence at Lachine mentioned in a former letter, the pecuniary outlay has been simply enormous during the last two years.

The new station for the Grand Trunk Railway is nearly completed, and this, while its remains clean and new-looking, will redeem in a measure the disagreeable qualification of general and thorough dirtiness applicable to all the stations of this line in Canada. The Union Station in Toronto is every bit as bad as other small stations, begrimed with smoke and train oil.

St. Alban's Cathedral, Toronto, is a great undertaking, the completion of which is not expected to take place for generations to come. It was set on foot by the Bishop of Ontario and some other influential members of the Church of England who were not satisfied with the low-church service conducted in St. James's Cathedral. Subscriptions were raised and a site purchased a very long way from everywhere. Further money was subscribed and a see-house erected and then designs for the new cathedral were wanted. A competition was suggested but the committee were told, rightly enough, that unless some kind of bonus was to be granted, the best men would not compete. Then the question was "What individual architects will take the matter up?" All the money that could be procured was needed for the building and the committee would pay nothing for designs. They received an offer, however, from a Toronto architect who supplied a design gratis and agreed to be satisfied with a fee for his visits of supervision. The chancel was started and is in progress and it is hoped the roof will be added soon. A large perspective view taken from the northwest angle has been published and, for the sake of the credit of the committee and all concerned, it is fortunate that it is not to be carried out yet, so there will be time for them to change their minds and do something towards obtaining something good and correct. Here is to be a great cathedral, a quarter of a million is to be expended upon it and the promoters of the scheme are in such a hurry to get the building begun that they will not wait till they can afford to get a design in even a decent manner but take the first design offered to them, gratis, without raising a question as to whether the design is good, bad or indifferent. One would think, judging from the design, that the architect had never designed so high a tower in his life before and it has the appearance of being piled up story upon story until it was about time to put pinacles on; there is no unity or homogeneity, and all is as crude and poor as it can well be, that is the southwest tower; the northwest tower ends in a spire, finikin and weak, and looks uncommonly like a second-hand spire, originally designed for an Evangelical meeting-house. It has apparently happened to be the same size at its base externally as the tower is at its summit inside the parapet, and the one is fitted down into the other squat and out of

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all proportion. The whole design lacks originality and has been unfavorably criticised in every direction. The promoters of the scheme have themselves hesitated, but they have come to the determination to complete the chancel sufficiently at any rate to enable them to hold service there, and as they are, under the existing arrangement with their architect, bound to nothing, intend to leave the nave and other parts to look after themselves. Probably by the time money is subscribed for the nave the grandchildren of these good men may like to have another design, for it is pretty certain this generation will see no nave.

It is sincerely to be hoped that the Minister of Education will be able to carry out his scheme of founding a Chair of Architecture. Of course, it is to be presumed that before doing so he will consider well the best way of making it suitable to the needs of the Province. We want something to be done which will not merely educate students but which will turn the attention of the already educated to what is true architecture. We have, as it is, far too many exponents of what is *not* true architecture and examples everywhere of the appearance of false art or rather that which is not art at all. Let him take the advice of those who are trained in the art, else it is to be greatly feared he will do more harm than good.

The alterations to St. James's Cathedral, carried out at a cost of $40,000, are progressing slowly and now that the building is dismantled it is disheartening to see the "shams" that have been resorted too in its construction — false effects produced by means of paint and plaster. The pillars of the nave have a stone core but the shafts attached to the four faces, the moulded caps and bases are all wood painted the color of the stone. Voussoirs of nave arches, the heavy cornice at the eaves, the dark panelled ceiling, of wood to all appearance, are all of plaster; cheap and effective but utterly false, in a place where above all other places, the work should be honest and true. This was executed some years ago: it is to be hoped, and no doubt it is a fact, that the architects engaged in the alterations now know better and have principles above such shamming. It is just as easy to decorate in color as to paint one material to represent a better one and we have none too much color in the materials at hand as it is. It is to be regretted that color decoration as a part of the architecture has become a secondary consideration not to be thought of except in special cases. Now that it is so conclusively proved that color decoration has been used for every style of architecture at all dates and by all peoples from the rudest tribes to the most highly cultivated nations, to omit color from a finished building is like omitting half the effect. But to color without regard to the correct shades and patterns is as bad as coloring stone to represent wood or galvanized-iron to look like stone.

The Parliament Buildings are slowly rising but they will hardly be above the first-floor level this autumn. A very large body of men is being employed but the building extends over so large an area that to the uninitiated it seems to go on very slowly. There was a good deal of trouble about the settlement of the competition for this building which took place several years ago. It was supposed to have been decided and one firm of architects appear to have counted on this supposition and believed their design was chosen. It was rumored that an action was to be taken out against the Government for the amount of the commission but apparently nothing has been done yet. The proceedings were certainly questionable, though had the matter been ventilated the ugly rumors afloat might have been proved groundless; but the fact that the professional referee is carrying out the building and not one of the competitors looks peculiar, no explanation being offered to the competitors. All the designs sent in were returned, the referee finding grave faults in each. It is one of those matters which it would have been better for all parties concerned to have cleared up. It certainly is time that concerted action should be taken in the matter of architectural competitions by architects of standing: it must be concerted and it must be general. If men, however, will enter into competitions without sufficient guaranty of the fairness of the awards, they must take their chance. So far, general competitions have proved for the greater part unsatisfactory, and those who have had much to do with them know very well that with the best conducted there is always more than a chance that the sealed-envelope plan will not be rigidly adhered to to the end. It still remains to be seen what will be the result of the Competition for the Board of Trade Building, in Toronto: the feeling expressed by the daily press is very strong against the appointment of an American architect. President Cleveland's desire for "Retaliation" has awakened in the breasts of the Canadians in general a desire to show that "two can play at that game." The Board of Trade made a great mistake in not limiting the competition to architects in Canada; but the intention at the outset was that the competition should be an entirely fair one and it is to be hoped it will be to the end. Nothing had been heard or made public by the end of last month as to the progress that Professor Ware had made with the designs under his charge. I hear incidentally that sixty applications for particulars of the competition were received by the secretary.

The new paper, *The Canadian Architect and Builder*, is filling a long-felt want of intercommunication between architects, builders and manufacturers in the Dominion. It seems to have set out in a right direction and gives local items of a character consistent with the objects of the paper in a concise form, though some of the correspondents are apt to be rather too "local" in news they forward. It takes up the matter of "importing designs" for buildings very strongly. It gives an epitome of all the building news of the country, and has been taken up by the "Toronto Architectural Guild" who at a recent meeting passed a resolution expressing interest in its success, so that it may fairly be considered an authentic dispenser of professional news. It gives one large illustration monthly; this month it is the design for the Toronto Court-House and City-Hall, that has been written about in former letters, the building which should be historical, as among architectural competitions, because of the peculiar management of the whole business. I would only say that a building for $200,000 was competed for, and all designs thrown out because it was supposed none could be carried out for the sum named. The design now to be carried out is to cost over $1,250,000.

Another subject that requires united action on the part of architects, is remuneration for professional services. Five per cent is certainly too much for some classes of buildings, as it is as certainly far too little for others. It is very good pay for factories and warehouses where there is no special amount of art or science required; but for the higher class of houses, for which the best and newest articles in fittings are required and decorative works introduced, it does not pay; and, when the work to be paid for at that rate is for heavy and extensive alterations and additions that often take far more time and trouble than a new building, an architect ought to be able to secure an amount that will pay him. If, as seems to be the case, five per cent is a recognized and sufficiently remunerative amount for the last five and twenty or thirty years, the character of the work an architect is now called upon to do for the same sum has materially altered, and both in construction and design a far greater amount of attention has to be given, deserving a proportionate increase in the amount of remuneration; at present but few can command higher pay, and fewer are ready to pay it. Architecture at present is a poorly paid profession, but the real comfort of living depends as much on a good architect as upon anything else. "Is life worth living?" Not if your house has been carried out by an ignorant architect. To obtain good quality a good price should be given, and as the quality provided by a great many is undoubtedly good, it should be paid for accordingly.

THE ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

DOORWAY TO HOUSE OF E. P. BRADBURY, ESQ., MARLBOROUGH ST., BOSTON, MASS. MR. W. WHITNEY LEWIS, ARCHITECT, BOSTON, MASS.

[Helio-chrome, issued only with the Imperial Edition.]

GOTHIC TOWERS AND SPIRES, PLATES 31, 32 AND 33. — ST. CUTHBERT'S, WELLS; ST. JOHN THE BAPTIST, KEYSTONE; ST. ANDREW'S, EWERLY; ST. ANDREW'S, HECKINGTON; ST. MARY MAGDALENE'S, WARBOYS.

[Issued only with the Imperial Edition.]

THE FIRST NATIONAL BANK, CINCINNATI, O. MR. JAMES W. McLAUGHLIN, ARCHITECT, CINCINNATI, O.

THIS building which has just been completed, occupies a lot 55 feet on Third Street by 75 feet on Walnut Street. The lower story or basement is of Missouri granite, the remainder of the exterior being built of Obsidian brick, of a dark chocolate color, trimmed with Iowa red sandstone. The building is 100 feet high to the top of the parapet. The ceiling of the banking-room on main floor being 22′ 6″ in the clear. The entrance-hall is wainscoted with marble and the interior finish is of quartered oak. The structure is entirely fireproof, iron-beams and fire-clay arches being used throughout, and columns and girders protected with porous terra-cotta and finished with Keene's cement. The roof is of Neuchatel asphalt laid on hollow fire-clay slabs fitted between the iron T-s. The staircases are of iron, the railings being treated with the Bower-Barff process, and having treads of red marble. All halls and the public space in bank are tiled with marble.

OFFICE-BUILDING, MINNEAPOLIS, MINN. MR. L. S. BUFFINGTON, ARCHITECT, MINNEAPOLIS, MINN.

DESIGN FOR A LODGE. MR. F. L. V. HOPPIN, ARCHITECT, PROVIDENCE, R. I.

DESIGN FOR LADIES' DORMITORY, WELLS COLLEGE, AURORA, N. Y. MR. W. H. MILLER, ARCHITECT, ITHACA, N. Y.

BAPTIST CHURCH, SANFORD, ME. MESSRS. STEVENS & COBB, ARCHITECTS, PORTLAND, ME.

HOUSE ON LOCUST ST, WALNUT HILLS, CINCINNATI, O. MR. S. E. DES JARDINS, ARCHITECT, CINCINNATI, O.

CHURCH OF THE MESSIAH, BROOKLYN, N. Y. MR. R. H. ROBERTSON, ARCHITECT, NEW YORK, N. Y.

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THE ASSOCIATION CONVERSAZIONE. — IMPROVEMENT IN DRAUGHTSMANSHIP. — THE ARTS AND CRAFTS EXHIBITION. — STAINED-GLASS. — THE NEW THAMES TUNNEL. — DEATH OF JAMES SELLARS, ARCHITECT.

LONDON, October 12, 1888.

I SUPPOSE architecture — like everything else — must have its season of rest. At all events, such has been the case here in England, during the past two or three months. Society has taken itself wings and flown away. The picture-galleries have closed their doors. The Institute of Architects has been given over to the tender care of the painters and decorators. The merry laugh and head of the student is sought for in vain at the Association. The very newspapers are at their wit's end to fill their columns with readable matter. All is silent, dismal and dull. But, with the advent of October, come brighter days. There is already a movement visible among the dry bones, and before the month is ended everything will be progressing as merrily as ever.

One of the signs of this returning life is the opening conversazione of the Association which took place on Friday last, at Westminster Town-hall; and the occasion this year was a somewhat interesting one, inasmuch as an agitation has been proceeding among the students in favor of a dance, on a large and extensive scale, being substituted for the frigid, stately reception which generally takes place at these meetings. The Committee of the Association were, however, quite proof against such frivolous suggestions, and the usual reception was, therefore, held. Perhaps it was a degree more frigid, a degree more stately than usual. But, what matter! The dignity of the Association was duly maintained, and English architects may yet thank God that they are not as other men are.

By far the most interesting part of the evening's entertainment was the exhibition of students' drawings, and it was simply marvellous to see the perfection to which draughtsmanship is carried nowadays. Indeed, unless a man is not only of first-class abilities, but also content to plod on night after night, long past midnight, he can never hope to achieve much distinction in the academical field. The successful competitor for the silver medal of the Association, Mr. B. F. Fletcher, son of Mr. Banister Fletcher, tells me that he has had practically to devote the whole of the long vacation to his work, and has postponed his holiday week after week till far on in September, when the short days and cold weather deprive them of half their pleasure, and altogether prevent sketching. Another student whom I know, in his determination to get the prize of a certain class, worked on through the winter, sometimes to two or three o'clock in the morning, and, for once for a whole fortnight, cutting his sleep down to four or five hours a night. The consequence was he became very ill. I might give you other instances, but these will suffice as examples to show you what evils this system of intense competition is producing, and it is a little difficult, at the moment, to prescribe a remedy. If men are prepared to sacrifice anything rather than be beaten in a struggle, how are they to be prevented?

Another sign of life is the Arts and Crafts Exhibition which has just been opened at the new gallery, Regent Street. This is the rather ambiguous title of a most excellent exhibition, based on the following idea: It is a well-known fact that in the various handicrafts, the purchaser of an article rarely comes in contact with its designer, rarely ever knows his name. The connecting-link between the two is the proprietary manufacturer or middleman, and as it is to his interest to keep the artist in his employ as unknown as possible, there is very little chance of recognition for really artistic power. We can recognize a painting as the work of a certain painter, and give him credit for his work, but, as regards the crafts, it is altogether different. Here the artists are very often poor, struggling men, without capital and destitute of the means to make their own productions known to the world. The result of this state of affairs — which is only the natural outcome of a refined civilization — is greatly to be deplored. The manufacturer has generally only one object, viz., that of making money, and, indeed, his connection with the arts is only for that end. To attain this object, he aims at producing articles which shall attract the masses. His one idea is to produce a good first impression, and whether the design is pure in its conception, or whether it is executed in a truly artistic spirit, is a matter of indifference to him, so long as sensational effects are produced, the uneducated taste of the general public satisfied and his own pockets well filled.

Is it, then, any wonder that under these circumstances the original skill of the designer becomes stifled, ground out of him, and he, feeling that his efforts to throw a little artistic feeling into his design are worse than thrown away, sinks to the unenviable position of the producer of those dull, lifeless objects that we see in the ordinary shop-window.

This is the state of affairs that this Arts and Crafts Exhibition Society is trying to alter, and it is for this purpose that this exhibition has been inaugurated. The principal subjects which are illustrated by exhibits, are: 1, textiles; 2, decorative painting and design; 3, wall-papers; 4, fictiles; 5, metal-work; 6, stone and wood-carving; 7, furniture; 8, stained-glass; 9, table-glass; 10, book-binding, and 11, printing. A perusal of this list will show at once the comprehensive character of the exhibition; indeed, to my mind, the Executive Committee has been a little too ambitious, since they are not able with the limited space at their command to quite fairly represent these various handicrafts. Short prefaces upon each subject by such masters of the arts as Walter Crane, T. J. Cobden-Sanderson, Somers Clarke and others are added to the catalogue, and, I believe, it is the intention of the Committee to arrange for lectures on the various subjects to be delivered during the progress of the exhibition.

I have not space here to notice the exhibits in detail, indeed, I think a few general remarks on the exhibition would be of more interest to you than a dry detailed critique.

The first thing one notices is the difference, the extraordinary difference, between the exhibits and the ordinary show articles in the shop-windows. One has been done for the love of the thing, the other to sell, one is full of artistic interest, the other is mechanical, lifeless. Another point which is very apparent, is the wonderful advance that has been made in these arts during the last five-and-twenty years. Take, for instance, wall-papers, and compare the beautiful and delicate combinations of form and color that are in use in our best houses at the present day, with the fearful and horrible productions of a quarter of a century ago. Indeed, the advance of wall-paper in artistic merit during the past decade, is very remarkable, and reflects all honor on those who are responsible for their productions. Stained-glass, too, is another subject which has lately shown great life and spirit, thanks mainly to such masters of the art as Mr. Burne-Jones. Mr. Somers Clarke, in his preface upon stained-glass, waxes very indignant with the producers of painted-windows. He stigmatizes Munich glass as "transparencies no better than painted-blinds," and states that "at the best the painted-window becomes an indifferent picture badly placed" — I am afraid Mr. Clarke has permitted his feelings to run away with him, and, although I agree with him in his statement that the stained-glass window "must play its part in the adornment of the building in which it is placed," yet, it by no means follows that "it is not an object to be looked at by itself." I cannot see that a stained-glass window is merely a feeble attempt at a picture. It is the product of an art in itself and should be criticised on its own merits, and not from the picture-painter's point of view.

Some most admirable examples of figure-work, cartoons of a large size, are exhibited by Mr. Burne-Jones, notably a figure of St. Michael, which forms part of a mosaic for the decoration of the apse of the American Church of St. Paul, at Rome. The whole scheme is extremely interesting, but the figure I have alluded to, in its vigor of form and expression, is extremely good.

For the last year or two, a work of some importance has been taking place in the City of London. I refer to the new tunnel which is being driven under the Thames, near London Bridge, to accommodate an underground railway, connecting the city with Brixton and the other southwestern suburbs. The City station is situated close to the monument erected in 1671–77, to commemorate the Fire of London, and a few days ago, a large block of stone from the top of the monument gave way and narrowly escaped injuring several people. The city authorities have taken steps to investigate its condition, and it is not yet known whether the underground works of this railway have been instrumental in causing the damage. At any rate, there has been a very serious subsidence on the other side of the road which will involve, I expect, the demolition of several shops.

I regret to have to inform you that I heard last night of the comparatively sudden death of the eminent Glasgow architect, Mr. James Sellars, who has, as you doubtless know, done some very excellent work in that northern city, and was the architect to the Glasgow Exhibition Buildings.

ROUBILLIAC THE SCULPTOR.— Roubilliac was a native of Lyons, where he was brought up to the trade of stonecutting. Showing considerable taste as well as skill, he devoted himself to the ornamental branch of his craft. Hearing that there would be larger scope for the exercise of his skill in England, he came to London, and was employed by a builder for the ornamental part of the work. One evening he found a purse with gold, and containing the address of the owner, Edward Walpole, Esq., to whom he restored it. Mr. Walpole was touched by the honesty of the workman, and asked him about his occupation. Having made further inquiry, Mr. Walpole got him into the studio of Cheer, a noted sculptor of that day, and he always afterwards patronized the French artist. Having set up for himself as a statuary in St. Martin's-Lane, the first work of public interest from the chisel of Roubilliac was a statue of Handel, from a single block of fine white marble. This was purchased by Mr. Tyers, the manager of Vauxhall Gardens, where it was erected, and attracted much notice. It is now in the possession of the Sacred Harmonic Society. This was the beginning of his celebrity. It is remarkable that the latest work from his chisel was the statue of Handel in Westminster Abbey. To have produced the best statues of Handel and of Shakespeare may well entitle Roubilliac to the high place he holds in the records of art. — *Leisure Hour.*

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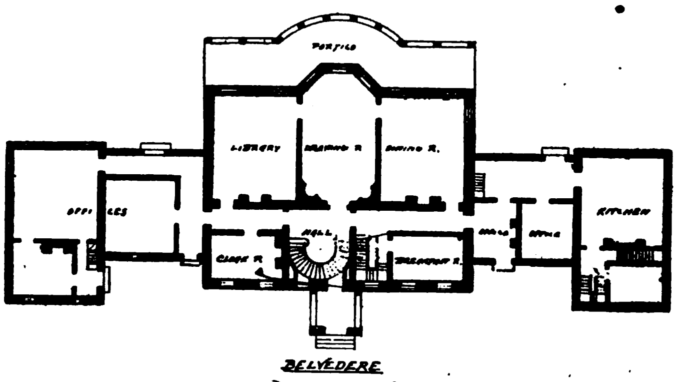
THE SURROUNDING COUNTRY AND ITS HOUSES. — THEIR TYPICAL PLAN. — "HAMPTON." — "BELVEDERE." — A MODERN HOUSE ON SIMILAR LINES.

ONE of the features most noticeable in connection with architectural and building interests about Baltimore just at this time is the development within the last decade of suburban improvements, particularly in regard to dwelling-houses and all the relations of home life, a development that is chiefly interesting not so much from its extent but because there is in it a very distinct element of change, not only a progress, but a transition from an old style of design, from an old form of life to a new; a change whose causes are perfectly recognizable and natural, and which becomes more strongly marked year by year.

With a climate whose midsummer is never too warm for health, or even for all the enjoyments of country life, producing a foliage the same in kind and as freshly green as that of New England, but whose greater luxury of growth tells us we are on the border lands of "the South," the natural beauty of the country surrounding Baltimore, particularly to the north and west, is singularly attractive in its general aspects of quiet interest. Elevated and rolling, from the higher points we obtain an extended view over the luxuriously wooded valleys and hills — with here and there the roof and towers of some prominent building showing above the trees — down to the distant city itself, half hid under the hills, and dim behind its hazy cloud of smoke and mist; while, beyond all, the bright waters of the Chesapeake Bay glisten in the sun. Our forefathers seem to have fully appreciated these advantages, and we find scattered through the surrounding country many houses built from seventy-five to a hundred years or more ago, some of the earlier ones being conspicuous as centres of social life when Baltimore itself was still a small town. An aspect of refinement and elegance — in some cases, of actual stateliness — and the suggestion of a rather lavish mode of living, characterize these houses, which were designed upon a certain typical plan — seldom seen in later buildings — thoroughly in harmony with the natural surroundings, and with the habits and customs of an age very different from our own of to-day — an age when slavery existed, when the life of a man of wealth and of high social position was much more one of careless ease and idleness, and more distinctly separated from that of his less fortunate neighbors than is possible in the neighborhood of a large city under the social conditions of the latter part of the nineteenth century.

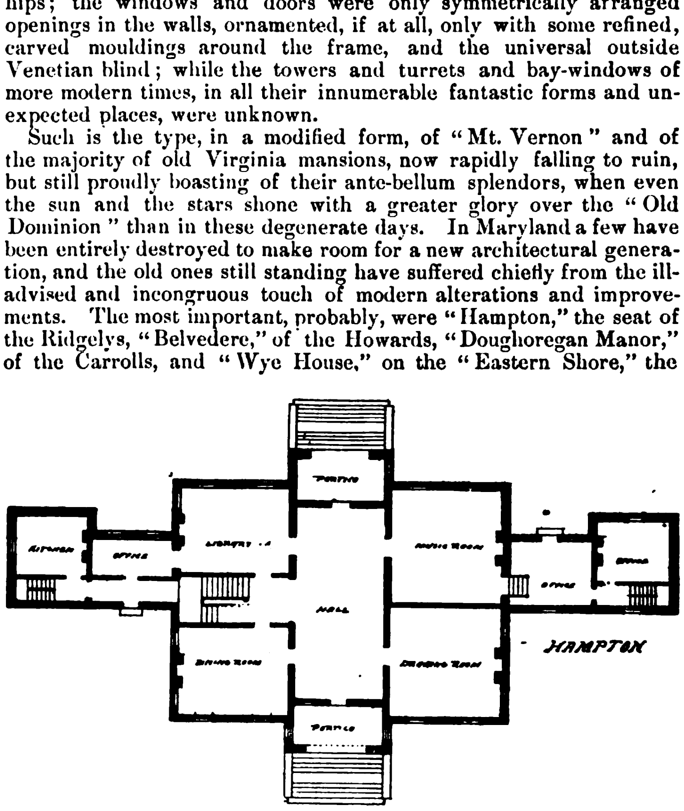
The typical plan of these old houses was based upon an idea of proportion, symmetry, and simplicity; no economy of space was necessary, and the exterior effects were usually inspired by the so-called "classic revival" that was then the ruling spirit in nearly all English domestic architecture, and naturally extended its influence to America, where social customs, particularly in Maryland, were still closely modelled after those of the mother country. But, unfortunately, as the English was in many respects only an imitation of the classic Italian, so the American became often — not always — only a weaker imitation of the English, and sham masonry of wood and plaster too frequently took the place of marble, stone, and brick.



BELVEDERE.

The general scheme usually comprised a large central building of two or three stories' height, containing a wide hall with large, square rooms opening upon it, and a main staircase, and with porticos of more or less stately proportions at either end. On either side of this large central building extended long, low wings, of only one or two stories, and symmetrically arranged for the exterior effect, — one containing the kitchen and various rooms for domestic purposes, the other a library, billiard-room, or business office of some kind. We note in the interior arrangement little thought of concentration or economy in the details of stairways, passages, etc., a great paucity of closets, and a total absence of the modern "buttery." The various parts of the group of buildings were roofed with simple gables or hips; the windows and doors were only symmetrically arranged openings in the walls, ornamented, if at all, only with some refined, carved mouldings around the frame, and the universal outside Venetian blind; while the towers and turrets and bay-windows of more modern times, in all their innumerable fantastic forms and unexpected places, were unknown.

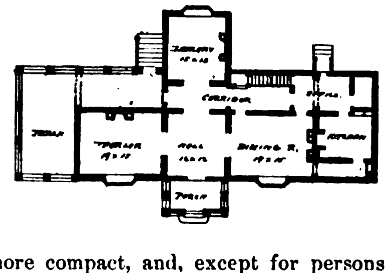
Such is the type, in a modified form, of "Mt. Vernon" and of the majority of old Virginia mansions, now rapidly falling to ruin, but still proudly boasting of their ante-bellum splendors, when even the sun and the stars shone with a greater glory over the "Old Dominion" than in these degenerate days. In Maryland a few have been entirely destroyed to make room for a new architectural generation, and the old ones still standing have suffered chiefly from the ill-advised and incongruous touch of modern alterations and improvements. The most important, probably, were "Hampton," the seat of the Ridgelys, "Belvedere," of the Howards, "Doughoregan Manor," of the Carrolls, and "Wye House," on the "Eastern Shore," the



HAMPTON.

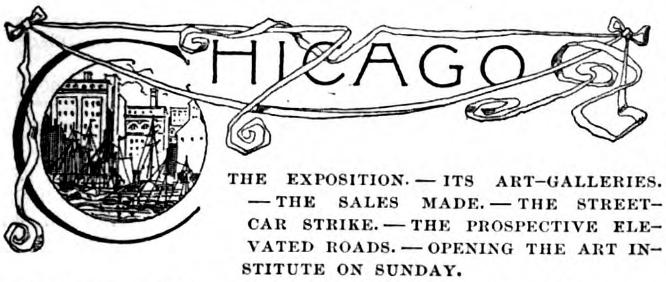
home of the Lloyds, this last of frame, the others of brick and stucco. Three of these houses are still in excellent preservation, and still owned and inhabited by the families whose ancestors built them. We give sketch-plans of "Hampton" and "Belvedere," the former situated about nine miles from Baltimore, and built in 1783 — and in Downing's "*Rural Architecture,*" the edition of 1859, he thus speaks of it: "It has been truly said of 'Hampton' that it expresses more grandeur than any other place in America. It belongs to the stately order of places unknown here at the north. . . . The façade of the house is one hundred and eighty feet in length, with offices attached, erected soon after the Revolution. The entrance-hall, of great width and dignity, passes the visitor to the south front, where is a terraced garden of great antiquity, with clipped cedar hedges of most venerable appearance. The formal terraces of exquisitely kept grass, the long rows of superb lemon and orange trees, with the adjacent orangerie and the foreign air of the house, quite disturb one's ideas of republican America."

Of "Belvedere," alas! not one stone remains upon another — the very ground upon which it stood has disappeared — levelled to the grade of the encroaching city's streets some dozen years ago, and what was once far below the lowest depths of its vaults, is now the bed of North Calvert Street, where all that survives to recall what once stood above it is the classic name of "Belvedere Terrace." This type of house is built no more, and as it was the result of conditions that will never exist in the future, it will probably never be built again. Maryland may be said to have changed her geographical position, as though the old "Mason & Dixon" line had moved down from the Susquehanna to the Potomac, and swept with it many of the details of practical life which had long obtained on her soil, leaving the voids to be filled by a rapid influx of ideas and practices that had already been adopted with more or less care and deliberation by her more northern neighbors; but these were sometimes found not to fit the new condition of things in the border State without a certain amount of readjustment and adaptation. The houses



needed to be smaller and more compact, and, except for persons of more than average wealth, not only to cost less in construction, but to be less expensive to live in and keep in order; to be well heated and to have sunshine in the principal rooms for winter comfort, and at the same time to be adapted to four or five months of open-air summer life, when wide doors and the protecting shades of deep porches is important; and in all cases rooms not too small for large pieces of furniture were a desideratum. The Eastlake and Queen Anne Villa, even in its most attractive form, has fulfilled its mission and has had its day, and is still having its waning twilight,

dying hard under the hands of the progressive property-agent and the intelligent carpenter. Its unlimited possibilities of being thrown together in all conceivable irregularities and eccentricities was too destructive of æsthetic repose, and its concentration of plan too unsuitable to the climate, to find lasting favor with the more thoughtful of the community. The architects have lately awakened to the fact that what is needed are moderate dimensions, and simplicity and symmetry of plan and elevation, combined with the refinement of classical or colonial details. The accompanying plan (made on about the same scale as those of "Hampton" and "Belvedere") is of a recently erected house on the outskirts of Baltimore, which, among others, is an attempt to carry out this scheme. Its outline will suggest not only the house as it is actually constructed, but several possible elevations, in frame or masonry, developing the idea of simplicity and balance of proportions.



THE EXPOSITION. — ITS ART-GALLERIES. — THE SALES MADE. — THE STREET-CAR STRIKE. — THE PROSPECTIVE ELEVATED ROADS. — OPENING THE ART INSTITUTE ON SUNDAY.

THOUGH probably unknown to the general public who live more than a couple of hundred miles away from here, every twelve months there takes place a display of Chicago life and activity that is commonly spoken of as "The Exposition." Actually, it has some quite lengthy official name, but to the populace at large and to the great unwashed it is only known by the above title. This exhibition takes place in the fall, and continues during the greater part of the months of September and October. In the main, it is an exhibit of manufactures, manufactured products, and fancy displays by the principal merchants of the city. The omnipresent folding-bed, the parlor-organ and the family sewing-machine jostle the terra-cotta exhibit and the display of sidewalk vault-lights: a flourishing pop-corn business is not in the least disturbed by an exhibit of brick-making machinery on one side, and a corset factory on the other, while, in the midst of all, a band dispenses music upon the just and the unjust. As a matter of course, in its main features, the exhibition is, year after year, much the same, being, as it is, an exhibit of the thousand and one industries, both great and small, that centre in and around Chicago. Still there is always one department, and that of the fine arts, that is different and is always crowded with visitors.

The twenty odd railroads coming into the city make the exhibition a pretext for selling half-rate tickets at this season of the year, and the result is that, in the aggregate, a really immense number of people visit Chicago either on business or pleasure, and always take at least a peep at the Exposition. Consequently, no exhibit in the West begins to have the same direct art influence over the great mass of people as does this display. At the Art Institute, the duration of the exhibit is ordinarily short, and, unless there be some very extraordinary attraction, the visitors are chiefly from the city or immediate suburbs; while at the Exposition the vast majority are people from out of town, who rarely see any exhibition of any artistic excellence; and all this renders the exhibits of the Exposition more far-reaching for art education than anything in this portion of the country. No commissions being charged on the sale of pictures, added to the care that is taken of the canvasses, make this exhibition a favorite with artists, even if the fact that, ordinarily, more pictures are disposed of here than at any other display in the United States would not of itself make it desirable to send pictures.

Thus the committee find their task comparatively easy, and almost always, at least, fairly successful. This year, the number of exhibits shown in the catalogue was over four hundred and fifty. Several of the walls nearly appeared as if this year's Paris *salon* had been transported bodily. On one of the walls, at least ten of the pictures had figured there, while the total number that had been exhibited there either this year or previously must have been nearly one hundred. One of the extremely curious and interesting features of the picture-gallery was a series of paintings (which have been already exhibited in several cities) illustrative of Japanese life and surroundings. This collection, though rarely portraying subjects in a manner especially calculated for a picture-gallery, was still peculiarly enjoyable to architectural students, as showing Japanese architecture, with its accompanying bright-colored landscapes and brilliant flowers. As usual, the daily papers had column upon column devoted to a more or less intelligent criticism of the art-gallery; but, suffice it to say, that the exhibit, while containing no very extraordinary pictures, has been generally very greatly admired for the good and high average standard of the work. Among the purchasers of paintings is mentioned the Detroit Art Museum, and, as the total sales are stated to have exceeded $16,000, the artists cannot complain greatly of not being appreciated.

During the past month two parts of the city have been more or less disturbed by a strike on the street-car lines directed against the Philadelphia syndicate that owns two-thirds of the street-car system. For several days all traffic was stopped on the West Side, and for over a week the people of the North Division were obliged to limber out their aristocratic legs, or have recourse to all sorts of antediluvian conveyance that no one imagined yet hung together.

Naturally, business of certain kinds was seriously interfered with; police detachments were flying hither and thither in patrol-wagons, while the few cars run were loaded principally with policemen. No riot of any real importance took place, but conflicts with the strikers were numerous, and the city for nearly two weeks, if not at the mercy of gangs of lawless men, was certainly not far from it.

At length "the union" was forced to give in, which it did with the worst grace possible, and the men went back to work, or, at least, such as could get a chance did, and now affairs are once more, at least outwardly, quite serene, although fisticuffs between union and non-union men are said to be of frequent occurrence. Such disturbance of the street-railway traffic makes the advent of the elevated roads more than ever earnestly desired by those who have suffered, and, without doubt, this last strike has done much towards bringing several schemes of overhead transportation to the more favorable notice of the public. Already several ordinances have been passed by the City Council granting rights and privileges, and one company is even said to have made such progress as to have acquired several pieces of property, and to have consulted with architects in a preliminary way as regards depots, etc. However, all is as yet in quite a chaotic state, but it is promised that within six months, rights-of-way will be obtained and preliminary surveys finished, so that a long-suffering public even now commences to see with the eyes of faith the long-promised means of rapid transit.

In the last month the Trustees of the Art Institute have, owing to the generosity of one of our citizens, found themselves enabled to throw open the galleries to visitors on Sundays, free. The hours have been fixed between 1 and 5 P. M. This has long been desired, but the difficulty has been the additional expense of attendants. This has now been removed, at least for one year, by Mr. James W. Ellsworth, who takes upon himself to defray the extra cost. The hours have been chosen as above to avoid the criticism that it would interfere with church-going, and it is believed that a very large class who are not at liberty other days, and, who especially need art-improvement, will take advantage of this privilege.

MISTAKES IN ARCHITECTURE.[1] — I.

"WE are all of us wrong sometimes:" so spoke, in the hearing of a friend of mine, one of our best-known humorists and men of letters. They were together on a steamer, and were watching the floundering of a sailing-boat being navigated by a mariner who clearly had made a mistake in handling his craft. The famous man had a young daughter with him, and she asked, "What, — pray what, — is he doing, father?" and got the reply, "He is wrong, my dear; we are all of us wrong sometimes."

No truer word was ever spoken; and, if for no other reason than because it is so universal a fate to get wrong sometimes, mistakes would be justified as a subject for a lecture. But there is a much better reason for my selection of this subject. Forewarned is forearmed; and, though I cannot promise you an immunity from all mistakes, I can, I hope, point out some into which there might perhaps be some danger of your falling, and against which you will be likely to guard if your attention has been called to them.

A mistake is always an evil, and often a most serious evil. There are mistakes which a man may make inadvertently, and without blame, but which yet entail consequences more serious and lasting than those which follow many a crime. Shakespeare paints Wolsey as arrogant, unscrupulous, shrinking from nothing so that he might compass his ends; yet it is not any of the dark deeds with which he is credited that ruins him, but the blunder of laying a paper intended for his own eye alone before that of the king. It is only a mistake when a signalman gives the wrong signal, or a pointsman turns the points the wrong way, but it may lead to the slaughter of a score of innocent persons; or, to come nearer home, it is only a mistake to miscalculate a girder, or misjudge a foundation; yet it may lead to the ruin of a fine building and of its architect's career.

If, then, you succeed, hereafter, in steering clear of even a few mistakes in consequence of their having been pointed out here, that will be ample justification for our spending an hour together about this somewhat uninviting subject. I propose that we shall take up in the first place students' mistakes, and secondly, those of architects; and, though I will try to be orderly, I greatly fear that, as mistakes are

[1] A lecture delivered by Prof. T. Roger Smith, F. R. I. B. A., at the commencement of the session 1888-89 at University College, London.

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subject to no rules that I know of, a discourse on them must of necessity be rather an irregular lecture. We shall, of course, have to leave unnoticed far more mistakes than can be considered; mistakes will therefore be selected which are, in the nature of things, not unlikely to occur. Many of them will be such as have actually come under my notice; and, in clearing some of them up, I shall ask leave now and again to borrow a hint from the proverbial wisdom of our forefathers.

There is one peculiarity about mistakes, and that which originates them, which makes it not a little difficult usefully to consider them in a mixed assembly. I allude to the difference in mistakes traceable to the wide differences in temperament, training, quality of mind, and habits between different men. Put two men to the same test, and they act differently. If that test be some circumstance in architectural study or practice, where there are several ways of going wrong, and but one of going right, each of them may make a mistake; yet it is all but certain that they will not both make the same mistake; they may each take a wrong road, but the roads will go in opposite directions. In acting as assessor in architectural competitions I have again and again seen this. One designer, for example, who is timid and perhaps inexperienced, with but cramped ideas, falls into the mistake of producing a formal, cold, spiritless design, correct perhaps, and possibly economical, but showing so little invention, and with so little worth remark about it, that it has no chance. His neighbor lets loose a fancy and fertility of design of which he is the fortunate possessor, utterly regardless of considerations of expense or suitability, and produces a splendid plan for a building that could not be put up for three times the money, and that, if erected, would be quite inappropriate to the site and purpose, and of course his failure is as complete as that of his rival.

Each of these two competitors has made the mistake of failing to understand what was wanted, but the failure has been in opposite directions. No. 1 has fallen short, No. 2 has overshot the mark. I shall have occasion in the course of the lecture to mention other mistakes which, so to speak, hunt in couples from this reason, and we may rest assured that many a man who is safe not to make a mistake in some one definite direction may be in great danger of running to the opposite extreme.

Student's Mistakes.— To turn now to students' mistakes. The one which first seems to present itself is neglecting opportunities. This, when wilfully done, is vicious; but it is a mistake often made out of pure thoughtlessness. Many a youth fails to realize that when he left school or college and entered an office he embarked upon a quite new career, and that he has to acquire knowledge in a different way, and to enter upon a totally distinct education. At school or college the schoolmaster or the professor teaches; in an architect's office the principal gives opportunities. The schoolboy, or, to a certain extent, the collegian, gets into difficulties if he omits or neglects to learn. There are no equally immediate uncomfortable results if a pupil neglects his opportunities; but, nevertheless, the loss to him is serious — in some cases irremediable — though in most instances, as I have said, I believe this neglect to arise entirely from failing to comprehend the situation, and not at all from wilfulness or idleness.

Every chance of taking part in what an architect or his assistant have to do in actual practice is an opportunity — even copying a letter, making a tracing, or entering a message in a call-book, is a lesson if the pupil chooses to learn from it: much more valuable are the chances of seeing work and materials. The nature and use of these opportunities have been dwelt upon very thoroughly in some of the published addresses of recent Presidents of the Architectural Association, and, to some extent, by myself on a former occasion of this sort; so that I hardly need pursue the topic further, but may turn to mistake number two.

It is a great mistake to lose heart and give up. I believe there comes to most young men a time when the novelty of their change of occupation and position has worn off and the irksomeness of routine is being felt, with possibly the depression due to being in lonely lodgings, instead of at a bright home or the sixth form of a busy school, and the wish to give up rises. Fortunately, in most cases this is practically impossible, and the student feels obliged to stick to his work, gets over his difficulties, regains heart, and goes on. But time and tone are often lost in the struggle, and it is a thing to fight against. Rest assured that, if your profession has been chosen with any degree of care, you are not likely to better yourselves by a change, and that to begin business life by losing a year or two, and starting afresh with the consciousness of a failure behind you, is, to say the least of it, unfortunate. Of course, occasionally a student turns up of whom one must in honesty say that the greatest mistake of his life was adopting the architectural profession. If a man is thoroughly unfit for a calling on which he has entered, by temperament, training, and habits, and he and his friends become honestly and deliberately aware that this is so, of course the only wise thing to do is to stop. But for one person who has really made such a mistake, there are probably a score who, for a time, fancy they have done so; therefore it is far safer to urge you to resist giving up than to suggest it as a good thing to do. Remember that "A rolling stone gathers no moss," and "Faint heart never won fair lady."

It is not, however, only the pupil who is apt to lose heart. There is a good deal of discouraging and difficult business to be got through by many young men in the interval between their articles and their start in practice, and again in the early days of practice. In all these difficulties, whatever you do, do not allow yourselves to be cast down. Constancy to a career is a matter to some extent, nay, to a very great extent, under a man's own control, and the man who succeeds is the one who resolves stoutly that, be the rebuffs or disappointments or perplexities never so trying, he will not allow them to master him, and who carries out that resolve.

The young man, perhaps fresh up from the country, who goes round to the offices of one architect after another, and who answers every advertisement in the papers, in the hope of getting employment, is on a very trying quest. But he is doing what most of us have had to do before him, and he is engaged in a way which has procured for many a man the opportunity of earning his daily bread, and for some has proved the first step in a career that has led to brilliant success. One of the most distinguished professional men of the day began his London career, when an unknown foreigner in our city, by answering the advertisement of a leading architect who wanted a young man to do nothing but trace in his office. This humble post he took, and filled sturdily till it was found how well he could do very much better work, and now his name is on every one's tongue. The proverb to take up when seeking for employment is: "Leave no stone unturned."

To the more advanced man, who is feeling — as who among us does not sometimes feel? — that it is very hard to get on, I may, perhaps, offer the suggestion once made to me by a very successful man when I was complaining that I found it difficult to get on. "Do not forget that the difficulties are your security" — a consideration which has so much in it when one comes to turn it about in one's mind, that I do not think any words of mine can add to its force.

One more proverb occurs to me: "Everything comes to the man who can wait." Everything that can come of itself seems to obey this law. Success is not quite included here, because — at any rate, in professional life — success can only come to the man who is fit to succeed. But, granted the fitness (and I trust you will all fit yourselves for success before your student career comes to a close) — granted the fitness, I repeat, even in so crowded a profession as ours, and so enormously difficult a place as London, success may fairly be expected to reward each man who can go on bravely struggling for a sufficiently long time, and who will not lose heart.

Once more, it is a mistake to lose heart if any particular attainment seems to elude you. Say you decide to draw the figure, the most valuable auxiliary to high-class architectural draughtsmanship, and you find it very difficult, or you decide to draw perspective, and you find it very perplexing. The thing to do is not to give up, but to go on; and if the difficulty takes twice the time and twice the trouble which it appears to have cost some comrade, believe me, the acquisition is more than twice as advantageous to you, and, indeed, more than twice as necessary for you as for him, so that your double trouble and double time have been well bestowed.

It is a mistake, if you have the opportunity of choosing what work you will do — an opportunity which to some extent a pupil often enjoys, though an assistant seldom — to stick too close to one thing. As far as possible, try to get a share in each sort of work that is in the office, and if it is work that you are not used to, and find difficult to perform, so much the more instructive is it likely to prove. It is also a mistake to shirk the work you do not fancy. A young friend of mine complained to me once that he was given a good many letters to write when he thought he ought to be drawing. I pointed out to him that when he was in practice he would have shoals of letters to write, and that the art of writing a good business letter does not come of itself — far from it; so that he ought not to object to have the opportunity given him of practising his hand upon what is as necessary a piece of attainment as draughtsmanship.

It is a mistake to take up too much that is outside your profession. Every young man ought to have some athletic pursuit — cricket, tennis, cycling, walking, riding, boating, swimming. But it is distracting to take up or keep up too many such pursuits, or give too much time to those you select. Similarly, some hobby or pursuit that is not exactly architectural, such as a certain amount of reading and a certain amount of society, are good, and, in moderation, desirable. But learning a profession is an arduous task, and the men who will succeed best are those who give up their evenings, night after night, to pursuits akin to architecture, such as a school of art, the Architectural Association classes and meetings, or working up privately book after book on construction, materials, etc., or practising design, or drawing, or working at the joiner's bench. You will find in many other professions the demands made upon the time and attention of students leave them for years little leisure for any outside pursuit whatever; and I do not think architecture requires less thorough devotion of time and power than does medicine, or law, or commerce, or that there is less to learn in architecture than those other professions.

It is a mistake not to sketch. Going and looking at architectural buildings is just a little better than not seeing them, but not of much permanent service. Photographs, whether you buy them, or, what is worse (because it takes so much time up), make them, are almost worthless as substitutes for the results of your own sketching and measuring. What you draw you look at — you, to some extent, understand, and you generally remember, while the drawing will always remind you of what you saw and tried to fix on your paper. Some young men are disposed when they get a summer holiday to boat or bathe, or ramble about, as if their daily occupations as archi-

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tects were of no more interest to them than those of a linen-draper, and ought to be forgotten, instead of being fostered at holiday times. Holidays are the best opportunities of architectural study possible, and, let me add, as soon as the first difficulty of sketching architecture from buildings is got over, sketching tours are the most enjoyable holidays possible. More can be learned in a fortnight's well-directed sketching than in months of work over books and drawings, and I will engage to say that the architectural traveller gets twice as much enjoyment out of any trip which takes him to cities and towns of interest as any of the ordinary travellers he will fall in with on his route.

It is a mistake to sketch or to study alone, if it can be avoided. *Noscitur a sociis*, which, being freely Englished, is, "Birds of a feather flock together"; and, though a man's books and drawings are not bad companions, human comrades and friends are more useful, if only they be of the right sort. The best comrade for a beginner is one who is more advanced than himself, and, fortunately, the tyro, if teachable, is far from being the worst companion for the advanced student. Habits, circumstances and opportunities, of course, differ, and under certain conditions a man must study alone; but much time is often lost, and mistakes are apt to be made by those who work alone, and especially if they work without guidance. The opportunities of getting good instruction and of associating with other students are, fortunately, on the increase, and are so well known that I need not recapitulate them here; but I will add that studying together in this class-room has been, as I have reason to know, a beginning of student friendships, some of which have lasted through life.

On the choice of subjects of study I have not much to point out, but I cannot forbear saying that it is a mistake to despise surveying. Many students consider that they ought to prepare themselves for purely architectural practice, and for that only, and that everything which can go by the name of surveying is unnecessary, if not beneath them. They believe surveying to be, at any rate, wide of their line, and that it is to be accordingly shunned; but when they come to practice they will find that a certain amount of surveying work will come in their way, and must either be done or handed over to better-prepared persons. I am not now speaking of quantities, the preparation of which is to a large extent a distinct work, but of all that relates to the examination and care of existing buildings. If you reflect that in any city or town for one new building there are hundreds already in existence, and that each of these hundreds is likely to be repeatedly surveyed, now for repair, now for alteration or enlargement, now for sale, or purchase, or rating, and possibly again after injury by fire, you will see that the mass of surveying work in the aggregate is considerable. Much of this can be better done by an architect than by any other person, and from time to time every architect is asked to make surveys under circumstances which make it clear that if he cannot or will not, valuable connections will go elsewhere. Nor is this all. Architectural practice is always fluctuating, and not infrequently the question of surveying work or none is a question of bread-and-butter or none. So do not consider that surveys are nuisances or interruptions, but pick up what you can about them, and, if a chance offers, by all means try to see a little land-surveying. A very few days in the field will make the methods of working clear to any one who has not forgotten his trigonometry.

There is a companion mistake, one, I mean, of an opposite character, which is sometimes made, and which may as well be noticed. It is the mistake of neglecting design. Designing is the highest part of an architect's work, and it is work that he must be able to do. I am quite aware that it is of no use for a beginner to try to design. He has no materials yet, and it would probably be more likely to do him harm than good if he attempted to originate out of the emptiness of his knowledge something that should represent a building. But designing does not come of itself, and yet many students go on for years accumulating knowledge and experience, and make no attempt to exercise themselves in design. Whenever one has made a piece of architecture one's own by studying, sketching, and measuring it, it is a wise course to try to design a variation upon it, making use of the same features, details, and ornaments, but re-arranging them. This may be done, if you like, upon a single feature and an extremely small subject, and from such beginnings there are many ways of going on. What I wish to urge here is that it is a mistake not to begin.

The last mistake with regard to study that I feel bound to name is the mistake of not going on the Continent. This is, perhaps, not so prevalent as it was in the height of the Gothic revival time, when many good students believed that if they could thoroughly master English Gothic they need not attempt more. Now that Renaissance of some sort is being more generally practised, more men go to Italy and Greece, but still the number is small in comparison with the number of pupils and students. This, I repeat, is a great mistake, and if you say that it is a serious expense and absorbs much time — which are the two things that can be said against a Continental tour — the answer is that, as to time, it cannot be better spent, and, as to money, there are few liberal professions where some expense is not absolutely necessary at some time, while the scholarships and studentships obtainable give to a few students in each year substantial assistance. Certain it is that this period of continuous study in other countries, and under other suns, seems more than anything else to make the difference between the mere draughtsman and the accomplished architect.

[To be continued.]

SOCIETIES

BOSTON SOCIETY OF ARCHITECTS.

AT the last regular meeting of the Boston Society of Architects, held Friday, November 9, the following officers were elected for the ensuing year: President, Edward C. Cabot; Vice-President, Charles A. Cummings; Treasurer, William G. Preston; Secretary, Arthur G. Everett; Committee on Elections: John A. Fox, F. W. Chandler, Edmund M. Wheelwright.

COMMUNICATIONS

SLOW-BURNING CONSTRUCTION.

BOSTON, MASS., October 30, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In rejoinder to the communication from "Salamander" published Oct. 27, I beg to say that the questions which I lately asked relating to construction, were not intended to apply very closely to dwelling-houses. The risk of loss by fire in dwelling-houses, especially of the second and third class, is very small for the reason that they are nearly always occupied by many persons and the fires are discovered quickly enough to be customarily extinguished without severe loss. The heaviest losses in dwelling-houses occur in first-class or palatial dwellings where the injury to the decorative part of the structure is often very great.

The mill methods might, however, be applied to dwelling houses. One has been constructed in this way at small cost by a gentleman who was formerly an inspector of this Company, to whom I have written for working plans and specifications. The cost did not exceed that of ordinary construction in any considerable measure. A somewhat costly dwelling-house has been built after this method in the neighborhood of Philadelphia, under the supervision of Mr. H. W. Brown, formerly President of the Philadelphia Mutual Fire Insurance Company, by whom, also, an office-building on Walnut Street was constructed in the same way which he afterward sold at an extra price on account of its great security from fire.

I would ask the following questions as this seems to be the best method of bringing out the facts:

Given a country dwelling-house to be covered-in either by a pitched roof, hipped roof, French roof or "crazy roof," of the ordinary construction; rafters eighteen inches to two feet on centres; covered with boards *not* customarily matched but laid open-jointed; occasionally back-plastered between the joist but more often plastered only on the line of the joists inside; to be covered with shingles or with slate. Although the inter-spaces between the joists are mostly stopped at the plate, are there not apt to be many means of communication between these hollow spaces and the hollow spaces in the walls of the house, these also being connected with the hollow spaces in the floors and partitions? Does not this convert the whole house into a series of connected wooden cells?

When the heat passes through the thin outer covering of the roof from which there is no ventilation at the top, does it not force its way down through the hollow walls of the house, thereby rendering the house much hotter in summer than it need be? Is there not an analogy between this sun-heated oven for the concentration of heat on the roof with the over-head system of heating by steam-pipes within the rooms of a factory, which has proved to be the most effective method of raising the temperature and distributing the heat within the factory itself?

Does not this cellular structure give opportunity for the free course not only of fire but of vermin of all sorts, no matter what precautions may be taken in putting stops above the sill for the purpose of keeping the vermin out? Would not this roof serve the purpose of keeping out heat, rain and snow very much more effectively if the inside timbers were worked of suitable size by computation of the load to which they may be subjected and were placed eight feet to ten feet apart on centres; if two-inch plank, grooved and splined, were then substituted for the thin, unmatched roof-boards, and if good shingles were always used in preference to slate? Or might not good one-inch boards grooved and splined be put on, then three-quarter-inch mortar, and then the shingles? According to our experience with factory roofs this would be the best method; we have specimens of shingles in good condition which are more than fifty years old, which were originally laid over mortar, the mortar being laid over the roof-boards.

What would be the difference in the quantity of timber and in the cost of this mode of constructing the roof of a dwelling-house as compared to the ordinary method?

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I may refer to the laboratory and boarding-house combined in one large building at Woods Holl as an excellent example of the solid timber and plank construction, plastering laid directly on the plank, secured by dove-tailed lath. This large building was built under the supervision of the late Prof. Spencer F. Baird, the original specifications having been furnished from this office. I may refer to the large building lately constructed by Professor Morris at Cornell University, on the principle of slow-burning construction, the lower rooms of the two-story building being occupied as workshops, the upper room for drawing: the top floor of the second story consists of one-inch boards, the under floor of two-inch planks grooved and splined, with a layer of mortar between. Professor Morris assured me that this arrangement completely stopped the passage of sound. At the time when I visited the building the workshops were unoccupied and perfectly quiet; there were a large number of young men and women engaged in drawing in the room above; I could hear no sound although they were moving about in their ordinary manner.

It is for the purpose of inducing students to take up these problems and to develop the crude methods by which we have secured safety from fire in factories, to warehouses, churches, etc., that I have put the questions lately submitted; these questions are specially pertinent with respect to the construction of almshouses, hospitals and asylums.

Can the construction of a hospital, almshouse, asylum, college-building or library now be justified on the cellular principle? Hollow-floors, hollow-wall, hollow-roof, each connected with the other by wooden flues through which fire may pass from cellar to attic, thus assuring the maximum of loss from the minimum of cause? How many of the buildings of which you have given plans and elevations in the *American Architect* are stone or brick shams or veneers concealing this bad and dangerous mode of construction? E. A.

A CORRECTION.

New York, N. Y., October 31, 1888.

To the Editors of the American Architect: —

Dear Sirs, — Allow me to call your attention to the fact, that in the editorial in your issue of October 27, in computing price per pound of French and Belgian iron-beams, you assume a metric ton (*tonne*) to be 2680 pounds avoirdupois, whereas it is only 2204.7 pounds.

The metric ton of one thousand kilogrammes is about equal to 2680 pounds *Troy*.

The above-mentioned wrong assumption alone makes a great error in the price in cents per pound, as shown by you, and renders your comments upon, and deductions therefrom, useless, so that further comment is unnecessary.

I *believe* your quoted prices per hundred kilogrammes (13 francs for French and 11.75 francs for Belgian beams) refer to the smaller sizes of inferior quality, but as I do not know your authority for these quotations this last is only a belief as stated. As to your doubts regarding the ton recognized by the United States Custom House, I can say that the customs due on building-beams is one and one quarter ($1\frac{1}{4}$) cents *per pound*, thus making a rate of $28.00 per ton of 2240 pounds. Traverse.

[We took the formula for converting kilogrammes to pounds which happened to be nearest at hand, — that in Cooke's "*Chemical Physics*," which was Troy pounds. This would make a difference of about twenty per cent in the figures, and would reduce the *ad valorem* equivalent of the specific duty to one hundred and twenty per cent, in place of one hundred and fifty. Our prices for French and Belgian beams were taken from the *Chronique Commerciale et Financière* of *Le Génie Civil*, as the market rates for "*fers à planchers*," nothing being said about dimensions or quality. — Eds. American Architect.]

NOTES AND CLIPPINGS

India-rubber Pavement. — The authorities of the city of Basle, says *The India-rubber and Gutta-percha Journal*, intend re-paving their principal thoroughfares, and are now considering the material best suited for the purpose. In one street a trial was given to wood pavement, but somehow it does not give satisfaction. The decision, therefore, turns upon asphalt or India-rubber. The latter was invented by the German engineer, Busse, in Linden, near Hanover, and was first practically used about fifteen months ago for paving the roadway over the Goethe Bridge in Hanover, which required about 1,000 square metres of material. This first experiment proved so successful that during the present year another street in Hanover was paved with India-rubber, to the extent of 1,500 square meters. Berlin is already considering the advisability of availing itself of the same pavement, and has given it a fair trial by laying it down over a considerable distance near the Lützow bank, which example is being followed by Hamburg. The India-rubber pavement is said to combine great elasticity with the hardness of stone, to be completely noiseless, and to suffer neither from cold nor hot weather. Moreover, it is not slippery, like asphalt, and is more durable. — *Invention.*

The London Monument in Possible Peril. — The danger to the Monument arising from the vibration caused by the trains on the Underground Railway, which is much nearer than Wren would have liked, and against which he would, had provisions been granted him, have provided as he did for the shaky foundation of the northeast pier of the cupola of St. Paul's, has suggested to many that the column should be strengthened below the surface of the earth. The recent fall of a portion of the cap had, we suppose, nothing to do with the tunnel. The nature of the stone may account for it, and we have no expectation of the Monument suddenly collapsing. Cracks would warn the custodians, who may possibly remember that the disintegration of the empire has been associated in a popular legend with the downfall of the Monument. To remove the column from its present position, where it combines with the neighboring buildings (as the great Roman columns did when they were erected), and is, therefore, alone of the metropolitan columns, appropriately placed, would be a folly no other time than the present — when every meddling simpleton has his say — could be expected to discuss. It would, however, have its parallels in the proposal to widen London Bridge on cantilevers (an outrage which the energy of Street and Sir F. Leighton hardly averted), and the removal of Decimus Burton's arch from Hyde Park Corner, which Mr. Shaw Lefevre actually carried out. — *London Athenæum.*

TRADE SURVEYS

Old signs for measuring or prognosticating commercial or industrial activity are proving unsafe. The new conditions into which the country is passing, are calling for new standards for calculation. The business interests have been surprised with the results so far this year. The railroad companies have been doing a larger business than they had anticipated. Gross earnings have been more satisfactory and net earnings have been far better than in last May or June, when the maximum point in cutting of rates had been reached in the Northwest. Notwithstanding so much was said about excessive railroad construction, the facts and statistics now show that the evil was overestimated. The numerous statistical tables and statements all converge on one point, namely, that traffic has been expanding week by week and month by month and that net earnings, while on some systems they have been very low are as a rule much better than we expected at the opening of the season. Railroad managers are encouraged, when the results of the season are all averaged up. Very careful railroad authorities in Chicago, announced last week that steps would be taken to put their various systems into an excellent condition of repair. That both locomotive capacity and rolling-stock would be largely added for next season, that a great deal of mileage would be entered upon to complete and round out the various systems converging at that point. Financial and railroad authorities in New York City have within the last few days announced their determination to enter upon the work of constructing new railroads, none of them very long but in the aggregate making a large amount of mileage, much more than was contemplated earlier in this year. There will be more North-and-South roads built next year than ever. The increasing intimacy between the States north and south of the Ohio River, is opening up opportunities for the expenditure of a great deal of money in the construction of lines which will expand the industrial conditions of the regions of country through which they pass. The out-flow of capital into these States south of the Ohio River which has assumed phenomenal proportions for two or three years past will exceed the volume of those years. The rank and file of investors who formerly invested in railroad building or in stocks are now crowding into other channels, principally manufacturing, where they are finding better returns. A system has been partially developed for the co-operation of small investors where for a small commission they can be furnished with opportunities to place their money. In this way a great deal of manufacturing capital has been well located in the region of country beyond the Mississippi and south of the Ohio. Steel rails dropped last week to $26.50 in Pennsylvania. Upwards of 100,000 tons have been sold within ten days. The rail-makers are undecided whether to accept the lower rate and book orders or to resist it by refusing to allow large allotments for the coming season. The makers of all kinds of iron are now in sight of a heavy demand for the coming winter, but the demand will not be sufficiently strong to advance prices. This is in their favor rather than against them. The coal-producing interests are still holding production to the utmost capacity. The anthracite output last week exceeded 32,000,000 tons or 3,300,000 tons in excess of the production at same date last year. Coke has been advanced and all buyers of coke are anxious to secure as much as they can. The Pennsylvania coal and coke tonnage for the past year foots up 13,136,115 tons, an increase over last year of 1,460,477 tons. The lumber traffic of the country when aggregated, shows a remarkable increase over last year in a few of the larger cities. The manufacturers of wood-working machinery in the Western States, have been doing a rather moderate business for three months past but within a few days some of the heaviest manufacturers have given out the opinion that there will be a rush of work during the coming winter. At certain points in the West, particularly Minnesota, there is a large accumulation of lumber but those who know most about the market, among both buyers and dealers, anticipate no depression in prices on this account. The movement of lumber from mills to market on the Great Lakes is enormous. Stocks are accumulating rapidly at all lake ports. So far the increase over last year is 150,000,000 feet at Tonawanda and Buffalo. There has been a slight falling off this fall in the demand for lumber in the larger eastern cities, but it has been compensated for by a heavier demand in the interior where the smaller towns are thriving under the stimulus of an increased demand for manufactured products. There is a general scarcity of cars upon nearly all railroads. Managers have been backward about placing orders on account of the small net earnings. A wiser policy will control railroad managers hereafter. Orders are now being received at several of the locomotive-works for engines, to be delivered next spring. There is a disposition to adopt the iron cars on many railroads, in place of wooden, and this new car will, no doubt, meet with a great deal of favor. One very encouraging feature that has developed itself within two weeks is the rush of orders for almost all kinds of hardware for the equipment of a good many shops. Those who have immense interests at stake, the success of which depend upon liberal supplies of currency, are pushing forward their various new enterprises, on the belief that the policy of the Government will be continued in the future as it has been in the past. Within three years, the volume of currency available for the exchange of commodities and services among the people has increased to the extent of $2,000,000. Any policy which would restrict the volume of currency would hamper trade and discourage new enterprises. The great captains of industry are giving more attention to the financial question than they did in years past, for they now recognize that the currency is the motive power which controls trade and expands or limits the industrial operations.

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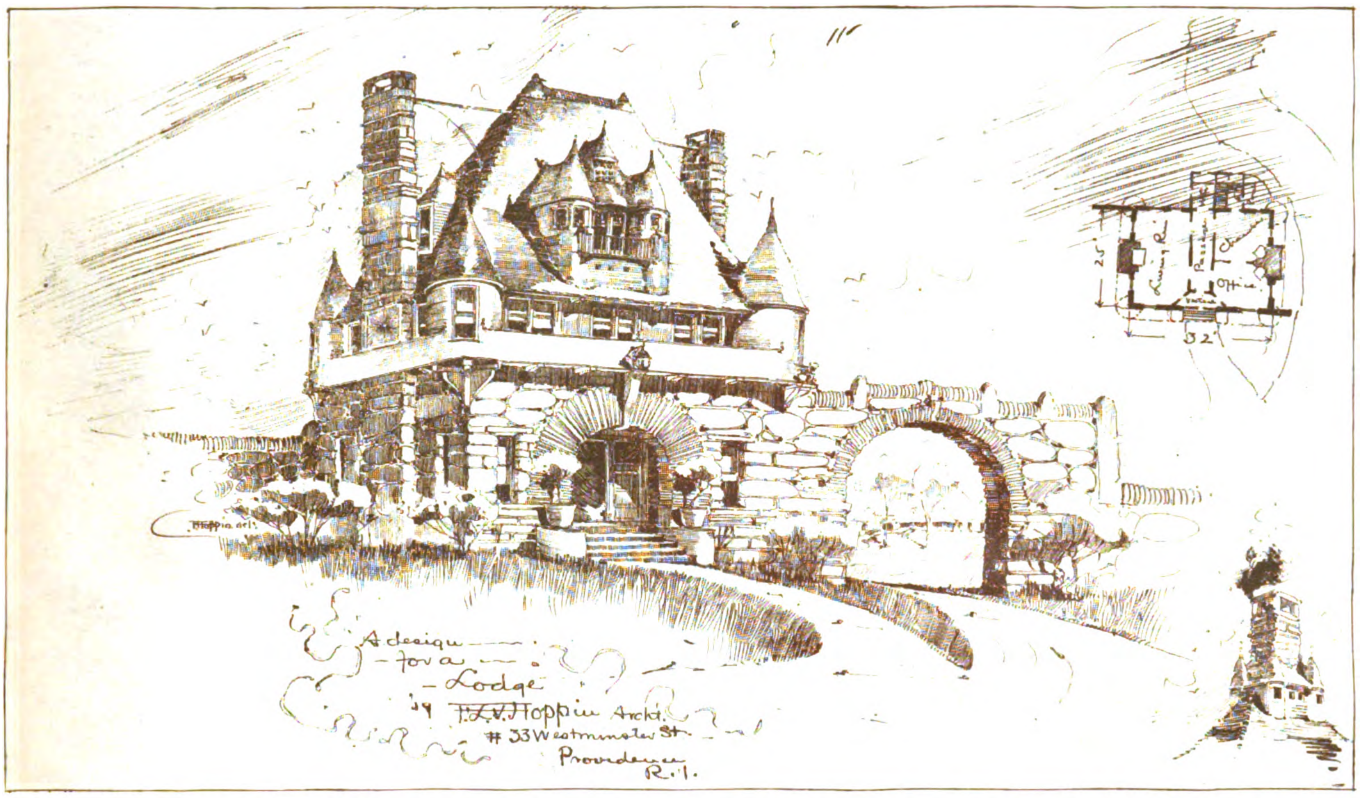

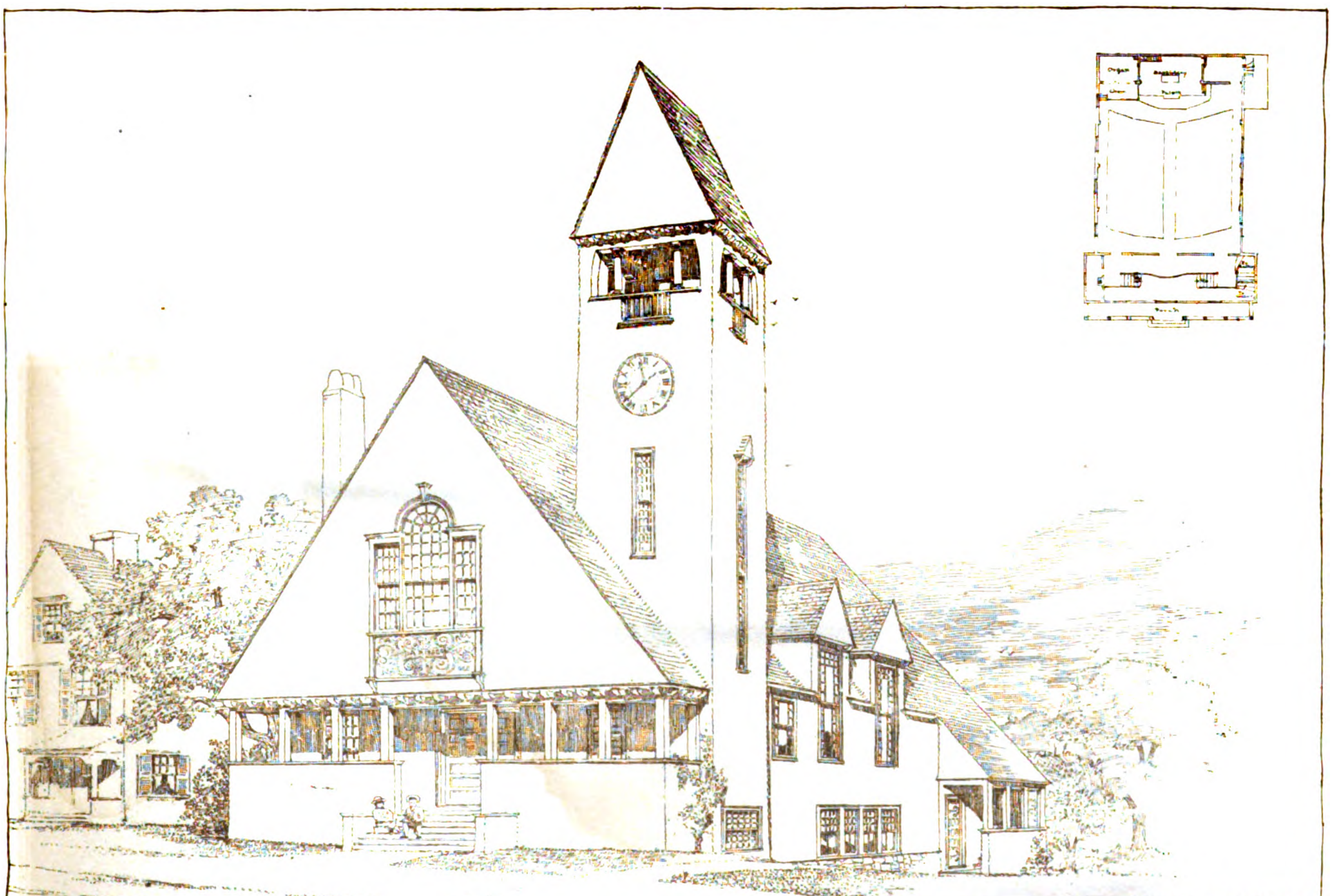

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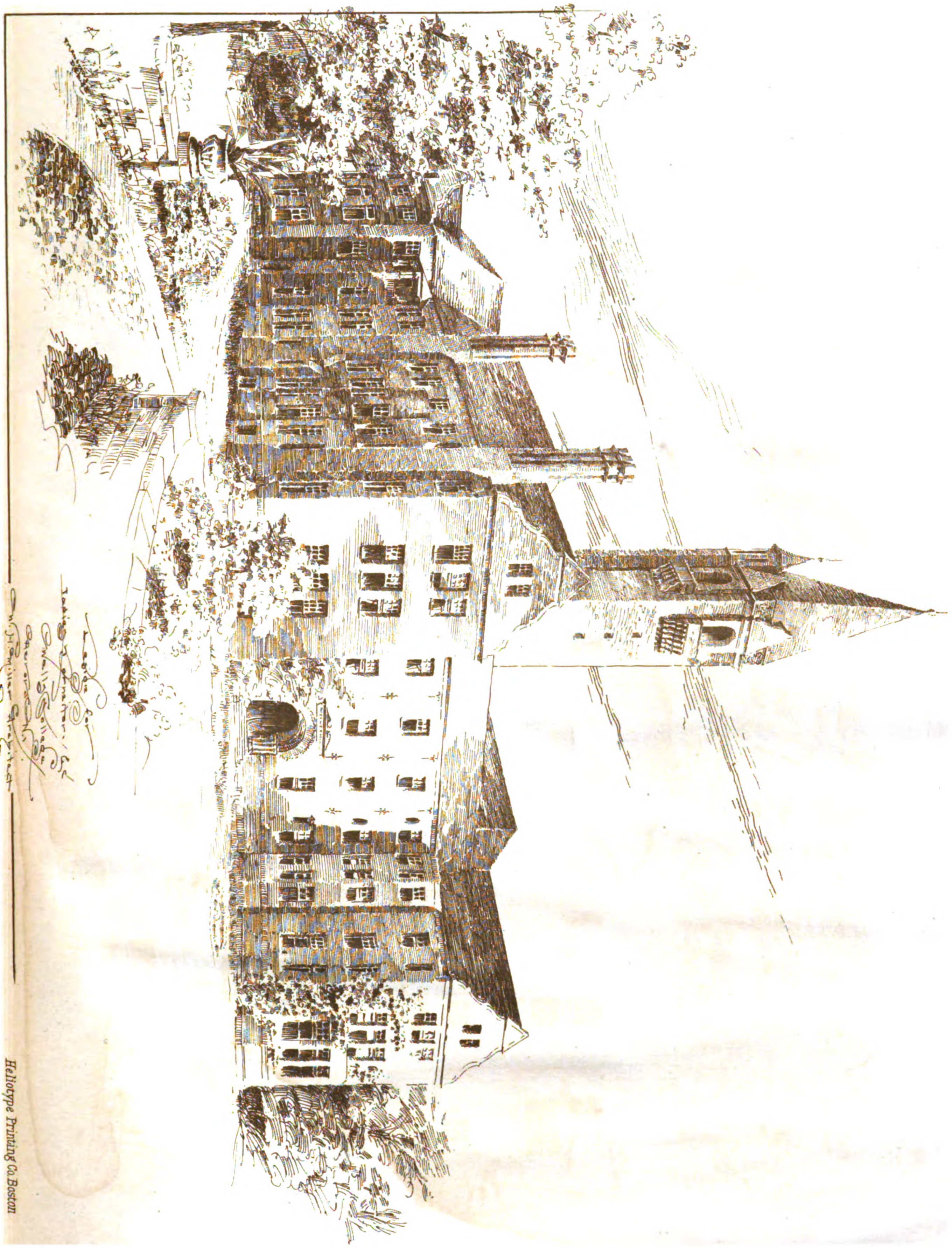

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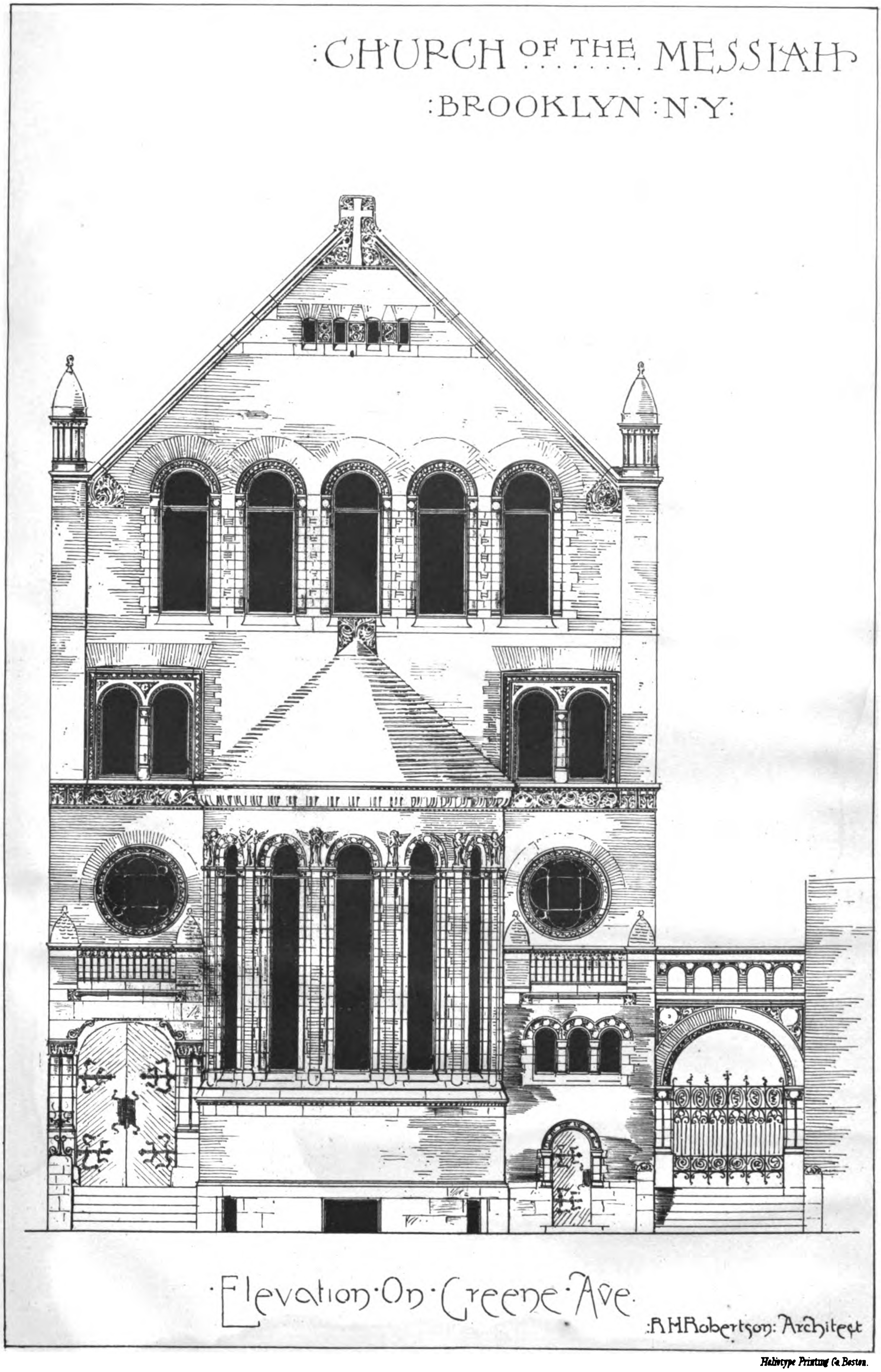

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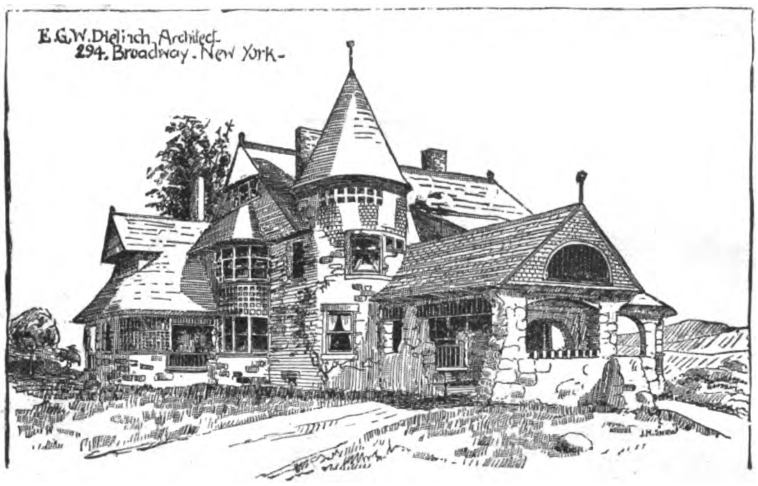

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made, sued the valuers for the difference between the price for which the estate sold and the amount of the mortgage. If the defendants had faithfully measured and inspected the building, and had given their honest opinion as to its value, there seems to be no question, judging from the example of the case cited above, that they would have been held harmless, even though their opinion might have been a very mistaken one; but in this instance the judge held that "they had incurred a duty toward the mortgagee to use reasonable care in the preparation of the valuation"; that they had "failed by their negligence to fulfil this duty, and were, therefore, liable for the consequences." Moreover, as the judge said, they had made a statement recklessly, expecting that it would be acted upon, and had taken no care to ascertain whether it was true or not. This, he considered, amounted legally to "fraudulent misrepresentation," and made them responsible for all damage resulting from their conduct.

IT is possible that the rapidly increasing intercourse between this country and the Spanish-American republics may have an important influence upon our architecture, which has hitherto been derived almost exclusively from English and Dutch prototypes. One of the first Latin habits to be domesticated among us will, we hope, be the use of the court-yard in city mansions. For small houses in closely built towns the slice of building, with a narrow front and rear, must, we suppose, continue to be employed; but for the city dwellings of rich people the entrance by a *porte cochère* into a private court-yard like that of a large Mexican or South American house, or a mansion in the Faubourg Saint-Germain in Paris, with its fountain, its orange-trees and azaleas, and its faithful concièrge to keep the gates closed against intruders, gives an air of aristocratic exclusiveness, as well as an impression of happy and well-bred home life, guarded from insolent intrusion, which is not conveyed by a much larger area on the outside of the buildings, as in the Vanderbilt or Stewart grass-plots in New York, or the doleful, high-walled front yards of the great London houses. There is one house in New York, the well-known Tiffany mansion, which boasts a court-yard and a *porte cochère*, with an iron gate, but the court is paved, and is so irregular in shape, and so dark and gloomy in appearance, that the principal source of enjoyment in it consists in the contemplation of its beautiful gate; and anything like a house "*entre cour et jardin*," after the Paris fashion, is as yet unknown here.

WITH the provision of a little touch of quiet, smiling nature in the middle of their houses, which is, we hope, reserved for the rich citizens of the future, should be introduced something of the Spanish-American construction. While our towns are being continually swept away by fire and replaced, a Mexican or South American city grows by accretion, such a thing as a conflagration being unknown. Even in Buenos Ayres, a city rivalling in population, wealth and enterprise almost any of those in the United States, a destructive fire is impossible. Although wood is used, as with us, for floor-beams, the floors themselves are of large, thin bricks, about thirteen inches long, laid on the beams, and covered with tiles set in mortar. This makes it next to impossible to burn through a floor, and the walls, which are of brick, without furring, wainscoting or bases, and with solid frames for windows built into them, are even more fireproof, so that a bonfire might be kindled in any one room in the house, with very little probability that the flames would extend farther.

EVERYTHING in the way of a suggestion for making the meetings of professional societies interesting is of value, and our entertainment committees might perhaps with advantage observe the doings of the Swiss and German associations of architects and engineers, and see if some of their devices for promoting mutual acquaintance cannot be acclimated here. Unlike the French, who view with horror the idea of admitting ladies to professional meetings, or the English, who invite them only to formal *conversaziones*, the Germans and Swiss make their relations with their professional brethren a source of pleasure for their families, as well as themselves. The architects and engineers of Berlin possess a spacious club-house, where entertainments of all kinds are given, and even the smallest societies manage to have frequent *soirées familières*, where the wives and children of the members meet, to be entertained with friendly gossip, and games, theatricals, or some other inexpensive amusement. There is no reason why these social occasions should not be extremely pleasant. As a rule, architects and their families accord very well in regard to education, tastes and income, so that the first essentials of pleasant social intercourse, mutual respect and sympathy, with the absence of any occasion for patronizing or envy, are provided for; and the rest would follow easily with a little effort. To any one accustomed to general society in this country, there would be a grateful relief in meeting a room full of people, all of whom could be depended upon to know that a Tintoretto was not something to eat, that the clerestory of a cathedral was not the same as the crypt, and that Queen Anne never saw a shingle, and none of whom would be either willing or able to crush their newly-made acquaintances by hints of their own enormous wealth. In such company, and only in such, can a man who loves his profession allow his mind to expand freely, and to find itself refreshed by the sympathy of others, and strengthened by the effort which he will make to deserve both sympathy and approval.

ANOTHER way which the Swiss societies have of making their meetings interesting and profitable is to choose as a subject for study and discussion some desirable municipal improvement, as, for instance, a scheme for a chain of parks, a bath-house, a street widening, or a new public building. At the worst, the study of a project of this sort is very useful to the members, who have the advantage of getting in one evening an amount of expert instruction on the subject which they could not otherwise accumulate by a month of reading and inquiry in case they should be suddenly called upon to undertake a work of the kind; and in many instances the results of the deliberations of a body of specialists would be regarded with great curiosity by the municipal officials or by public-spirited citizens, and, if the time were favorable, might be carried out.

WE have all seen the beautiful Austrian bent-wood chairs and furniture, which owe their popularity, perhaps, as much to their charming design as to their strength and durability; and most of us have had some curiosity to know how they were made. The *Revue Industrielle* explains the matter — at least, so far as the processes could be observed at the industrial exhibition at Budapest. Within the last few years the methods of treating the wood have been improved, and the application of the material much extended; carriage-wheels, for instance, having their rims made of a single piece of ash or oak, bent to a circle, with great advantage in point of strength and cheapness over those made with felloes sawed in small sections out of straight pieces of wood. The material to be bent is, for furniture, usually red beech, which grows very abundantly in the Hungarian forests. The timber is sawed into strips one and one-half to two inches square, according to the work for which it is intended, and then turned in a lathe into smooth, round rods. These rods are placed in an air-tight case, where they are exposed for fifteen minutes to the action of superheated steam. They are then so soft and pliable as to be easily bent by hand, and are in this condition fitted to iron patterns, well secured, and left to dry. The drying takes from two to eight days, according to the size of the piece. When it is complete, the wood is detached from the pattern and is ready to be joined with other pieces, varnished, polished, and sent out in the shape of finished furniture.

THE great Eiffel tower in Paris, notwithstanding all the rumors about difficulties in its construction, has, at the last advices, reached a height of five hundred and fifty-three feet, and is therefore the highest structure in the world, being three feet higher than the Washington Monument. Its growth from this point will be very rapid. Even now, the gang of one hundred and forty men employed on it carry it forward at the rate of more than three feet a day, and as the diameter of the shaft diminishes it will develop faster vertically. A few days ago there was really some trouble with the men, who pretended to be frightened at the height at which they had to work, but a financial remedy soon relieved their fears, and they now find no reason for apprehension. If the weather continues favorable, the tower will be complete by the first of January. Although it is as yet little more than one half its intended height, eight-ninths of the ironwork has been put in place, and the slender open shaft which forms the rest will be quickly finished.

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BUILDERS' HARDWARE.[1] — XIII.

SASH–BALANCES.

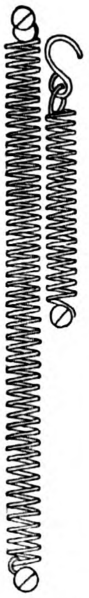

Fig. 173. Anderson Sash-balance. Wm. G. Anderson.

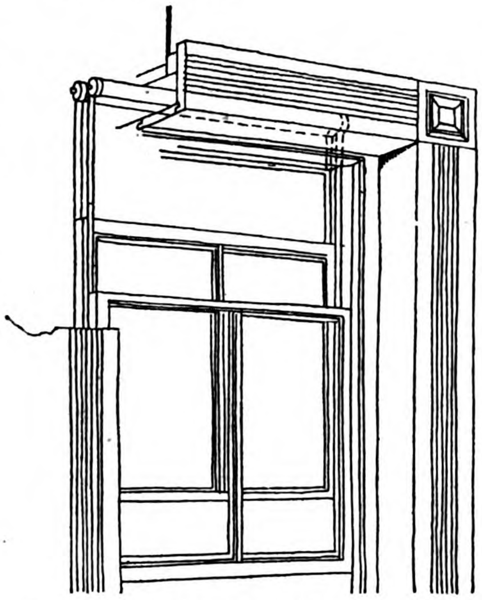

Fig. 174. Ormsby Sash-balance. Ormsby Sash-holder Co.

THE inconveniences attending the use of weights and pulleys for raising sashes, while in most cases due to bad workmanship in setting the pulleys and imperfect arrangement of the boxes rather than to any intrinsic deficiencies in the system, have given rise to several so-called sash-balances, which are intended to permit of weights, boxes and ropes being entirely dispensed with. Indeed, the natural outgrowth from the idea involved in the "Acme" sash-cord would be that a plain spring could be made to answer the purpose of both weight and cord. This has been done with the "Anderson" sash-balance. Figure 173, which consists simply of a steel, spiral spring for each sash, from ⅜ inch to ½ inch in diameter. The springs are fastened to the hanging-style of the window-frame and to the sashes, and are made of just sufficient strength to sustain the sash in any position, so that a very slight exertion is sufficient to move it either up or down. The springs are made the same length as the sash; and, being secured near the bottom of the sash, are drawn out to twice their length when the sash is down. When a sash is hung with this kind of balance, it has to be fitted with some form of self-catching sash-fast, as otherwise the window might fly open as soon as the hand was withdrawn. Anderson uses the "Attwell" sash-fast for this purpose, which will be described in a subsequent chapter, though any other self-locking form would answer equally well. The retail price for the four springs necessary for two sashes weighing fifteen pounds each, is $1.35. For forty-pound sashes the price is $2.50, and other sizes in proportion. When the sashes weigh over fifty pounds, the size of the spring required becomes so large as to render it rather too conspicuous for ordinary use.

The "Ormsby" sash-balance, Figure 174, is on exactly the same principle as the ordinary shade-roller, consisting of two strong spring-rollers which are concealed in a pocket over the window-head, the sashes being suspended therefrom by thin brass bands which coil around the roller. The price of this sash-balance varies from 75 cents for a window with fifteen-pound sashes, to $1.75 for fifty-five pound sashes.

A third type of sash-balance is illustrated by Figure 175. This has the general appearance of an ordinary sash-pulley, being mortised into the hanging-style in the same manner. Inside of the pulley, however, is coiled a strong band-spring of steel, attached to the axle, which is fixed, and to the outer edge of the wheel, in the groove of which is wound a narrow brass ribbon serving instead of a sash-cord, so that when the sash is drawn down, the ribbon is uncoiled and the spring acted upon. The spring can be set to any desired tension, and its action can further be regulated by a brake on top of the wheel, which is tightened or loosened by turning a screw in the face-plate.

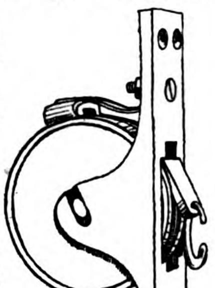

Fig. 175. Shumard Sash-balance. Coleman Hardware Co.

The "Shumard" sash-balance is made for runs of from thirty-two to forty-six inches, and for sashes of from eight to forty pounds' weight. The price per pair, for a sixteen-pound sash, is $1.40; for a forty-pound sash, $3.25 per pair, and other weights in proportion.

One advantage which all of these spring-balances possess is, that they act most strongly when the sash is down, enabling one to move a binding window more readily than if it were hung with ordinary weights and cords, while, when the sash is up, the springs barely suffice to hold it in position and do not offer resistance to drawing down, as is the case with weights. The objection, of course, is, that the springs are in constant tension, and will, in time, loose their elasticity. They can be replaced quite as easily as worn-out ropes; still, most people seem to prefer the old-fashioned weights and pulleys.

SASH–CORD ATTACHMENTS AND WEIGHTS.

There are several devices for attaching the cords to the sashes. The commonest method is to cut a groove on the side of the sash with an enlargement towards the bottom, and then simply knot the end of the cord, the knot holding in position. It is better to use some form of sash-cord iron. Figure 176 is one of the simplest forms. It is mortised into the side of the sash and held in position by a screw, the sash-cord being knotted under the hook. This form retails at 35 cts. per gross. Figure 177 illustrates an iron used when the sash is hung with two cords on each side. This retails at 52 cents per gross.

Fig. 176. Sash-cord Iron.

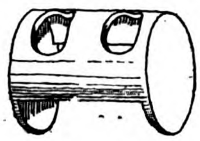

Fig. 177. Double Sash-cord Iron.

Figure 178 is a form quite similar to Figure 176, though requiring a deeper mortise and being driven in on a slant, so that it cannot work loose. It retails at $1 per gross. Figure 179 is different from either of the preceding forms, consisting of a cartridge-shaped cylinder, closed at both ends, but with an opening at the top and the bottom, through which the cord is passed and wedged by the eccentric cam shown by the figure. The cord is released by inserting a wire, as shown. This fixture retails at $1.60 per gross.

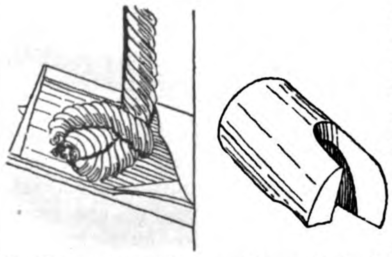

Fig. 178. Jackson's Sash-cord Iron. Ireland Mfg. Co.

Sash-weights are usually made of cast-iron, to order. They are cast in plain round-bars with an eye at the top, substantially as has been shown in Figure 170. When the sashes are very heavy, or the space for the box is restricted, lead weights are used, as they occupy less space than iron. They are usually made to order, and can be had in any desired shape, but are manufactured in regular weights by a few of the lead-works. Figure 180 is the form adopted by the Raymond Lead Company. Each section is cast on an iron rod extending through the weight, with a hook at one end and an eye at the other, so that as many sections may be hung to each other as may be necessary.

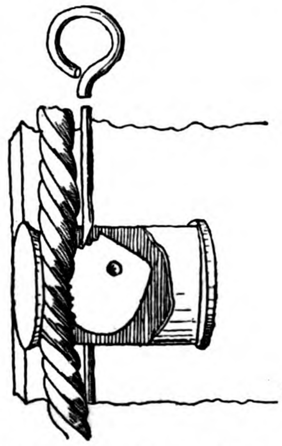

Fig. 179. Rodgers Sash-cord or Chain-fastener. Nimick & Brittan.

Fig. 180. Raymond's Sash-weight. Raymond Lead Co.

[1] Continued from page 229, No. 673.

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Iron sash-weights cost $1\frac{1}{2}$ cents, and lead-weights from 6 to 7 cents per pound.

SASH-LOCKS.

Sash-locks may generally be said to be devised for the moral encouragement of the faint-hearted, who cherish a fond belief that when the lock is turned no intruder can possibly enter through the window. Most of the forms in the market are sufficient protection against a sneak-thief, but while nearly every sash-lock in existence is claimed to be strictly burglar-proof, and advertised as such, the burglar must be a novice, indeed, who would let even the best of them keep him out of a house. When the window is secured with a fast which cannot be opened by slipping a knife-blade between the meeting-rails and pushing back the bolt, an enterprising burglar would simply break out a pane of glass, which can be accomplished with less noise than is made in picking a lock; so that, after all, the protection afforded by a sash-lock is more in sentiment than in fact. Still, that the timid be cheered and the stray tramp kept out of the silver closet, some form of sash-lock is always considered a necessity for all windows.

The requirements of a perfect sash-fast or lock, are that it shall fulfil the following conditions:

First, it must be so constructed that it cannot be opened from without by a knife, or by jarring the window. Second, it should, in closing, draw the two sashes tightly together, and, at the same time, should not be affected by any small inequalities of adjustment. Third, it should always remain either open or shut, with some sort of spring-contrivance to hold the lever in position, so that it will not be possible to leave the lock partially turned, thereby running the risk of breaking the muntins when the window is raised. Fourth, it should have no projections which could possibly tear the sash; and fifth, and perhaps most important of all, it should be simple in construction and in its operation.

It is not essential, though it is generally very well that the fast should be self-locking. It is not well to trust to anything which acts by gravity, or which depends on any perfectly fitted sash, as such appliances are apt to get out of order. It also is well that the lock should be as inconspicuous as possible, though neither is this essential. Some sash-fasts are provided with rebated appliances which fit down between the two sashes; this is not necessary, though it is perhaps a greater security, as in this way the fast can be more securely screwed onto the sash. In selecting any form of rebated sash-fast, however, it must be borne in mind, that sashes are made differently in the East and in the West. In the vicinity of Boston, it is customary to rebate the meeting-rails where they come together, but elsewhere, we believe the meeting-rails are usually simply bevelled.

Much ingenuity is to be observed in the line of patents for sash fasts and locks. This might be interpreted as an indication that either the sash-fastenings at present in the market are quite insufficient for their purpose, or that there is an extraordinary necessity for the species of protection which such contrivances can afford. This chapter, however, will but faintly indicate the variety of devices having in view the securing of sashes. One must wade through the list of Patent Office reports in order to fairly appreciate what has been done in this direction. A great many of these inventions never get beyond the Patent Office. Still, there are all sorts and kinds of sash locks and fasts in the market. Each one appears to be covered by a patent, yet somehow or other, the best locks and fasts are to be found in the catalogues of nearly all the manufacturers, so slightly disguised it is easy to see that such ideas are in a measure common property.

The terms sash-lock and sash-fast have been used synonymously, though a distinction should be observed between them. A sash-lock is understood to be some contrivance which actually locks a sash by means of some form of key. All of the other numerous devices which, by means of levers, catches or springs hold the sash either open or shut, are technically termed sash-fasts. The distinction, however, cannot be rigidly adhered to. Nearly all of the self-locking fasts might be classed with sash-fasts, while, with equal propriety, the sash-locks can be said to possess the essential qualities of sash-fasts; though, with very few exceptions, all are designated by the hardware dealers, as sash-fasts.

Figure 181 illustrates a form of sash-lock which is secured to the face of the sash, the bolt working into staples at intervals in the window-frame or stop-bead. The bolt work with a spring, so as to be self-acting, and by means of the key it can be locked, thus permitting the sash to be left partly open and secured against intrusion. This lock is light and strong, and well adapted to be used on screens as well as sashes.

Figure 182 is a type of several varieties of sash-locks which mortise into the sash and throw out a bolt in the same manner as an ordinary door-lock. In this example the bolt works with a spring, which makes the lock self-acting after the bolt has been thrown; that is to say, if the bolt were pushed back it would not remain closed until the knob or handle were turned. This lock may be operated with either a movable key or a flat knob or button.

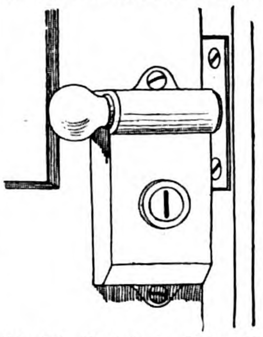


Fig. 181. Sash-fast. Yale & Towne Mfg. Co.

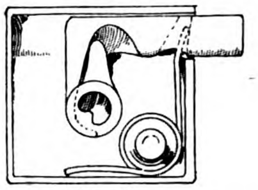
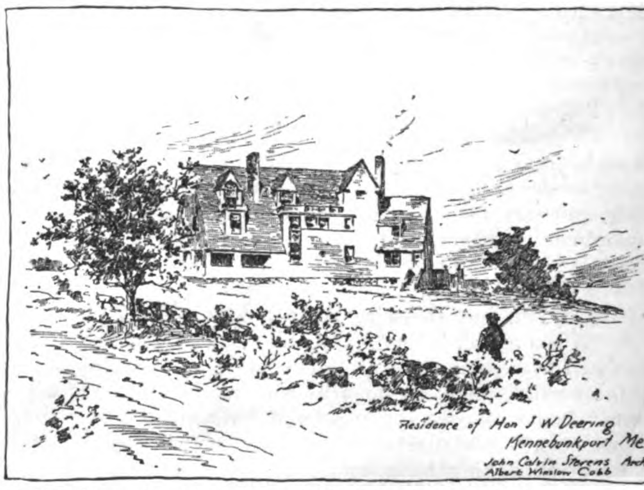


Fig. 182.

Of course, any mortise drawer-lock can be applied to a sash, if desired, or any other lock sufficiently narrow to fit the thickness of the sash, though the two forms just described are about the only ones especially made for windows, which can properly be termed sash-locks.

[To be continued.]

THE PROPOSED CONSOLIDATION OF THE ARCHITECTURAL SOCIETIES.



THE discussion that attended the introduction of the committee's report on the consolidation of the architectural bodies during the second day's session of the Convention of the American Institute of Architects, at Buffalo, was as follows:

Mr. Littell.—I ask for the admission of the report of the Special Committee to consider the report on consolidation. I ask for general consent to introduce this before we take up any other business. General consent having been given, Mr. Littell proceeded as follows:

The Special Committee to consider the report of the Committee on Consolidation entered upon its labors, and found it would require a very long time to fully work out a plan or suggestion in connection therewith, but your Committee unanimously agreed to present to this Convention a provisional report on a different line from that suggested in the report of the original Committee. Your Committee propose to retain Article 1 on page 2, as amended last night, Article 2, also as amended last night; to strike out Section 3, and for Section 4 substitute as follows: "Associations in States or parts of States may be formed with the approval of the Convention of the American Institute of Architects, with power to make laws and regulations for their own government. The local societies called Chapters of the Institute may be formed with similar powers, but in all cases the standard for admission into these subdivisions must be, at least, as high as that fixed by the Constitution of the Institute, and they must not conflict with the requirements of the body in which they are included. No person shall be elected to the Institute who shall not previously have been elected a member of the local society covering the territory in which the candidate resides."

It is then proposed to strike out Sections 5, 6, 7 and 8, and to amend Section 9 to read as follows: "The Convention of the Institute at large shall be annual. Unless ordered otherwise at the previous Convention, it shall be held in the official metropolis of the nation, the city of Washington."

It is proposed to strike out Sections 10, 11 and 12, and substitute

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for Section 12 as follows: "The American Institute of Architects shall have two grades of membership, Associates and Fellows, as defined by the Constitution of the present Institute. The Western Association may elect at a day previous to the proposed reorganization as many of its members to the grade of Fellow in the American Institute of Architects as there shall be Fellows in good standing in the present Institute at the date of reorganization, and all other practising members of each society shall enter the new Institute as Associates. After reorganization, no person shall be eligible to the grade of Fellow unless he shall be at the time of balloting an Associate, or unless he shall receive the unanimous vote of the Institute in convention assembled."

Then it is proposed to strike out Section 13, and substitute for Section 14 as follows: "The officers of the American Institute of Architects shall hereafter be a president and as many vice-presidents as there are chapters, an honorary secretary, a general secretary, a secretary for foreign correspondence, a treasurer, and a board of trustees. The board of trustees shall consist of the above-named officers and twelve members; the twelve members to be selected at the time of organization, shall serve, four for three years, four for two years, and four for one year; and thereafter four members shall be elected at each annual convention to serve for the term of three years." Section 15 remains substantially as drawn. Section 16 is stricken out, and the final clause is as follows: "These provisions shall take effect when ratified by a two-thirds vote of all professional members of the American Institute of Architects, and a two-thirds vote of all professional members of the Western Association of Architects, but when the same person is a professional member of each association, his vote shall be counted as only one-half a vote."

Mr. Cutler.— In regard to the Fellows of the Western Association, the proposition of the Committee is that the Western Association may elect to the grade of Fellow in the new Institute as many of its members as are at present Fellows of our Institute.

Secretary Bloor.— I move that Mr. Carlin, the Buffalo member of the Committee of Arrangements, be requested to have Mr. Littell's report printed at once and distributed, and that the consideration of it be made the special order of business for to-morrow morning.

Mr. Littell.— This is not a perfect scheme; it is merely an outline. To perfect the scheme will require weeks of work. We all want information, and want to see which direction the Institute prefers to move in.

Mr. Adler.— I think we would get on just as well if this committee were made permanent until the next Convention, and if it were directed, as was the committee which preceded it, to coöperate with the corresponding committee of the Western Association. I should, perhaps, like to see, if possible, this consolidation effected practically before the annual conventions of 1890 of the two organizations, and it appears to me that if these two committees will go to work at once, and will within three months from now — I think it can be done within that time — or within six months, at the latest, formulate definitely the scheme of unification, and if this report were printed and a copy sent to each member of both organizations, and, next, if one of two things were done — either to call an extra session of each body to consider the project of unification; or, what I believe to be better still, to make preparations for a letter ballot. It will be impossible to get a two-thirds vote of either the Western Association or of the American Institute at any convention, because we cannot get two-thirds of our members together. I don't know whether it is practicable under the statutory limitations of the Institute to resort to a letter ballot, but, if it is possible, that would be the only effective way to arrive at a conclusion, and, before making a motion that I contemplate, I would like to ask Mr. Bloor whether we can, under the present Constitution and By-Laws of the Institute, determine upon any action by letter ballot.

Secretary Bloor.— I don't recollect any provision in the By-Laws which would prevent the use of a letter ballot and it certainly is the most convenient, and I think the only practical, way of getting at the sentiments of the whole Institute. Unless we find something in our regulations showing that we cannot do this I will withdraw my previous motion and second Mr. Adler's motion just made.

Mr. Stone.— Before putting that vote I think it would be a good idea to get an expression from this meeting. If this convention thinks the thing we have proposed is all wrong we would like to know it. If they think on the whole it is in the right direction it will be a practical endorsement of the general idea which is embodied in the report, and if any further questions were asked some of us would try to answer in regard to the matter, or a more general outline could be made of what the scheme is.

Mr. Kendall.— It seems to me that the proposition to have the meetings annually is one of the very best propositions of the scheme. If we should meet only once in three years I think that would be the beginning of the end. We have got to get together every year in order to keep up the interest in our work, and I don't think by sections meeting in their own locality every two years and then meeting altogether every three years that that is the way to keep up our interest in the work, and I think the meetings must be held once a year in order for us to feel the importance of our work and take the interest in it which we should.

A Member.— I think the meetings should be held in different States as it will afford a change and give an opportunity for local architects to interchange hospitalities and civilities, and I don't think if we always meet in Washington it will serve the same end. One of the great inducements of our coming together is to visit different places.

Mr. Stone.— We provide for their meeting in Washington simply in case they don't meet anywhere else, or in case there is no other place appointed.

Mr. Nickerson.— I understood it was to be in Washington unless it was provided at a previous meeting where it should be held.

Mr. Adler.— I think the difficulty about that has always been due to the fact that the attendance at the conventions of the Institute has been very limited and also to the habit of the Institute always to lean upon its board of trustees and not dare to take any initiative action. Now we have no trouble in the Western Association in determining where our next yearly convention is going to be, and you can make up your minds, if you only will emancipate yourselves from the idea that it is not your duty to make up your minds, but it is your duty to remain in a state of infantile dependence upon your superiors.

Mr. Cutler.— I am quite sure I voice the sentiment of this committee when I say it was the intention that this board of trustees proposed in this report should merely have the control of the Institute at such times as the Institute was not assembled in convention; that the convention would have full power to decide upon the place of meeting, or any other question which might come before it, or direct the trustees. I am entirely in favor of going here and there and everywhere in the country. I want to go to San Francisco, and I want to go to Kansas City, and I don't wish to go always to Washington.

Mr. Gibson.— Most of the changes made in this report are different in the matter of Chapters; that is, the Chapters should not be limited one to each State. Some States will require two, and others will not be able to support one Chapter. In the matter of Fellows and Associates, I agree with it perfectly, and I may remind you that I, last night, proposed a similar scheme, namely, that the Western Association should choose from among its members an equal number of Fellows to be Fellows of the new Institute with the number of those in the American Institute of Architects at the present time. I think both of these changes are better, and I think the committee will find that this meeting generally indorses their actions.

Mr. Adler.— I offer the following resolution:

Resolved, That the committee of the American Institute of Architects upon consolidation of architectural associations be continued, and that it be directed to act with the corresponding committee of the Western Association in determining a definite plan of consolidation within the next six months. It is further

Resolved, That when this plan of consolidation has been determined upon and approved by the boards of trustees and directors of the A. I. A. and W. A. A. the same shall be printed, and copies of the same distributed among the practising members of both bodies. It is further

Resolved, That within one month from the distribution of these printed copies of the committee's report there shall be a letter ballot upon its adoption by the practising members of the A. I. A. and W. A. A., and that if approved by a two-thirds vote of both bodies it shall be declared adopted, and the two bodies consolidated under its provisions. The board of trustees of the A. I. A. and the board of directors of the W. A. A. shall, in case of such adoption, at once issue a call for a convention of the members of both bodies, to be held at such place and at such time as may then seem most expedient, and a reorganization of the A. I. A. shall be the order of business of said convention.

(Motion put and carried.)

REPORT OF THE SPECIAL COMMITTEE ON CONSOLIDATION.

TO THE AMERICAN INSTITUTE OF ARCHITECTS:

At the last Convention the following resolution was unanimously adopted:

Resolved, That a Committee of five members be appointed, of which the Chairman of this Convention shall be a member, *ex-officio*, the other four members to be selected by him, to act jointly with one of similar number appointed by the Western Association of Architects at their next general meeting, and to report as to the best and speediest method of consolidating all the Architectural Societies of America into one organization; the report to be full regarding form and constitution for local societies, and also regarding form, constitution, permanent place of meeting and proper quarters for the national, or representative, body. That the Western Association of Architects be and they are hereby cordially invited to unite with us in this work, and to appoint a Committee as above.

The other four members appointed by the Chairman, Mr. Kendall, to serve with himself, were Messrs. Burnham, of Chicago; T. P. Chandler, Jr., of Philadelphia; T. M. Clark, of Boston, and Bloor, of New York.

Since a formal preliminary meeting in December, at which all the members were present except one, and at which a skeleton report was adopted as the basis for consultation with the corresponding committee of the Western Association of Architects, consisting of Messrs. Adler, of Chicago; Ferry, of Milwaukee; Carlin, of Buffalo; A. Van Brunt, of Kansas City, and Root, of Chicago, the work of your Committee has been carried on partly by personal interview, but mainly by correspondence between Mr. Adler, of Chicago, a member of the Institute as well as of the Western Association of Architects, and the Chairman of the Association Committee, and Mr. Bloor, the Secretary of the Institute Committee, and the result of their labors and communication with their respective committees is the following project looking toward that Association being, in the future, united with the Institute, for the good alike of each Society, of the profession and its art, and of

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the American public, in name and organism no less than, as heretofore, in spirit, aims and mutual helpfulness, while at the same time it indicates what is believed to be a practical method by which all other American architectural societies may receive the greatest associative benefit possible to themselves, by being partakers in the historical and national and international prestige of the American Institute of Architects, the mother and pioneer of them all, as of all the able and useful serial literature representing the profession and building interests in the various sections of the Union — that experienced body whose constitution and ordinances have already been virtually adopted by all of these Societies as far as the differences between national and sectional conditions would admit, while its schedule of fees and recommendations for professional practice, in their main items, now over thirty years old, and directly the basis of the business and social standing — and indirectly the basis of the artistic standing of the profession — have invariably been adopted *verbatim et literatim*.

It is a proof of the wise choice made by the Committee of the Western Association of Architects, in leaving to Mr. Adler the correspondence on this important topic, that he, carrying his Association with his broad-minded views, has met the claims which, as the society of old standing, of large experience and of exclusively national aims, the Institute has felt itself called upon to make, in a spirit of recognition and comity, and that some of the best provisions proposed as to organization were formulated by himself.

Before reducing the suggestions of your Committee to items, we beg, on the difficult subject of a practical standard of professional requirements in candidates for membership, to quote bodily the following remarks submitted last year to the Western Association of Architects by Mr. Louis H. Sullivan, the Chairman of a Committee of members of that body to whom the question had been committed. This question has been one of frequent formal or informal discussion in the Institute, and is indeed as old as the history of art societies in any epoch or country; but the grounds of it, and the perplexities involved in it, have never, so far as our observation goes, been expressed with greater terseness and lucidity than by him.

"The difficulties which arise in connection with this subject are manifold and perplexing. If the standard for admission to membership be fixed with sole regard to what is supposedly an ideal, the numerical growth of the Association would be seriously checked and its usefulness in many ways impaired; for it is evident that such a policy would preclude the admission of those of average capacity, and of the many bright ones who are contending against the difficulties which beset a beginner.

"On the other hand, if the standard be fixed so low as to make possible the admission of all, it is evident that the standard of the Association would degenerate, and, through the prevalence of a low tone, its influence for good would cease and its career be short-lived.

"It is assumed by your Committee that the policy of the Association in this regard should be broad and democratic; that it should not set up factitious barriers against those who ask for admission; that the Association wishes to count among its members every thoughtful, earnest, ambitious man in the profession; that it desires its strength and stability to be derived from the standing and capacity of the average man; that it welcomes the fervor of youth; that it cherishes the honorable record of old age; that, above all, it should not place its standard for admission higher than it is itself prepared to exemplify.

"It is assumed, as a paramount consideration, that the applicant's record, be it short or long, should prove honorable; second, that he evidence fair artistic, constructive, or executive skill; third, that his admission shall necessitate an expressed pledge upon his part to sustain by individual effort a sound standard of professional bearing."

It is understood that the same gentleman is chairman of a committee (supplementary to and complementing that on requirements in candidates), which is now engaged on a Code of Ethics for professional practice in the nature of an itemized declaration to candidates of the rules by which they will be expected to govern themselves. It will necessarily be but an itemized formulation of the brief rule which for thirty-one years has made "the condition of membership" in the Institute "the honorable practice of the profession," but it will be awaited with interest by all intelligent and public-spirited practitioners.

The following are the items of the formula now submitted to your consideration and discussion:

1. The name of the proposed Federation shall be "The American Institute of Architects."

2. Any Architectural Association which shall adopt the "condition of membership" which has prevailed in the American Institute of Architects, viz.: "the honorable practice of the profession," may become a part of the new organization.

3. For the purpose of securing greater convenience of administration, the Institute shall be divided into three Sections, viz.: (*a*) the Eastern Section embracing all the New England States, other States lying on the Atlantic Ocean, and the States of Pennsylvania, West Virginia and Ohio; (*b*) the Central Section embracing the region westward of the above as far as the Western boundary lines of the States or Territories of Dakota, Nebraska, Kansas, Indian Territory and Texas; and (*c*) the Western Section, embracing the region westward of the last mentioned section to the Pacific Ocean. These three Sections shall be again divided into State Associations, and the State Associations may be subdivided into local organizations at their own pleasure and convenience.

4. The State divisions shall be called Chapters of the American Institute of Architects, and the sub-divisions of these State Chapters may be called Lodges thereof, and said divisions and sub-divisions shall be free to make laws and regulations for their own government, excepting only that the standard of admission to membership must be at least as high as that fixed by the Constitution of the Institute, and that they shall not conflict with the regimen of the body in which they are included.

5. There shall be an Annual Convention of each of the three Sections. The members of all Chapters within the limits of each Section shall be entitled to seats in such Convention, but in voting, an apportionment of votes proportioned to the number of members of each Chapter shall be made, and the members of each Chapter present at such convention shall cast the votes of their respective Chapters.

6. The officers of each Section shall be a President, a Vice-President, a Treasurer, a Secretary and five Trustees. These nine shall constitute a Board of Trustees, who may, for convenience of administration, elect from their Board an Executive Committee of three, which between the meetings of the Board of Trustees, shall have all of the powers of said Board.

7. The President, Vice-President, Treasurer and Secretary, shall be elected each to serve one year. Of the five Trustees first elected, two shall be elected for one year and three for two years. And after this, successors to the Trustees, whose terms expire, shall be elected each time for a term of two years.

8. The duties of these officers shall be as is customary for officers bearing these titles in similar organizations.

9. The conventions of the Institute at large shall be triennial, and, unless ordered otherwise at the previous convention, shall be held in the official metropolis of the nation, the City of Washington. The right of participation in the deliberations of these Conventions, and the assignment of votes to individual Chapters, shall be the same as at the Conventions of the Sections.

10. The newly-organized Institute shall be deemed formed whenever its organization shall have been agreed to by a two-thirds vote of all the professional members of the present American Institute of Architects, and by a two-thirds vote of all the professional members of the Western Association of Architects. But when the same person is a professional member of both the Western Association of Architects and the present Institute, his vote shall be counted as only one-half.

11. As soon as such votes shall have been had, the officers of the American Institute of Architects and of the Western Association of Architects shall hold a joint meeting, and shall issue a call to the members of the Western Association of Architects, and to the members of the American Institute of Architects, fixing a date for the convention, and inviting to said convention all of the members of the two organizations before mentioned, as also all members of all other architectural associations of good standing throughout the United States. At this convention the constitution shall be adopted, based substantially upon the principles herein set forth. And at this convention the voting power of the different organizations represented shall be proportioned upon their actual membership, and shall be exercised in behalf of each association, prorated as above stated, by the members present to represent the same.

12. Inasmuch as the present American Institute of Architects and other architectural societies affiliated with it or otherwise, have two grades of professional membership, while the Western Association of Architects and others have but one, only those Fellows of the Institute who have been in good standing for ten years or over shall retain the title of Fellows, all others entering the new organization as Associates. But at this convention there shall be elected, by ballot of all the professional members, a number of Fellows not to exceed in number one-twentieth of the entire membership outside of the old fellowships of the new organization. And in counting votes the names of those who are members of more than one of the old organizations shall be counted but once.

13. At each subsequent Triennial Convention of the newly organized Institute there shall be elected, by general and by letter ballot of all Associates and Fellows, additional Fellows to the number of one-twentieth of the existing lower grade professional members.

14. The officers of the American Institute of Architects, as newly organized, shall be a Board of Trustees embracing in its membership all of the officers of the three Sections, and from among these the Convention shall elect a President, Vice-President, General Secretary, Secretary for Foreign Correspondence, Treasurer and three others who shall be Trustees, who shall all hold office for three years, or until their successors are appointed, and who, by virtue of such election to the Executive Committee of the American Institute of Architects, shall remain Trustees of their respective Sections, until the next triennial convention of the American Institute of Architects.

15. The duties of these officers shall be as is customary in similar organizations. The General Secretary, Secretary for Foreign Correspondence, and Treasurer, shall be salaried officers, the amount of their salaries to be fixed in proportion to the revenue left after providing for expenses of publication, rent and other current outlay, and the General Secretary to be paid on the basis of the fact that if his work be adequately done, it must necessarily absorb all, or nearly all, of his working time.

16. In the year of the occurrence of the Triennial Convention of the Institute, the annual Conventions of the Sections shall be merged into the meeting of the Institute; the members of the Sections during such Conventions constituting themselves a sub-convention for the election of officers for the ensuing year, and such other business as may be peculiar to their Sections and not included in the transactions of the Convention of the Institute.

At each Triennial Convention there shall be an exhibition of the work, since the last convention, of professional members, and a jury of seven members, four of whom shall be of the higher grade, shall be appointed to adjudicate on the merits of the renderings exhibited; and a gold medal, inscribed with the name of the Institute and of the party to whom it is given, shall be awarded by said jury to the most approved design; and a silver medal, similarly inscribed, shall be appropriated for the design adjudged the next best.

When a large membership and consequent sufficiency of revenue shall warrant it, the Institute shall, with safeguards and under conditions to be prescribed by the Governing Board, undertake the defence in law of its members against injustice, in cases involving principles of general interest to the profession.

The question of increased revenue for the Institute, apart from the last conditional proviso, and for general purposes, was specifically referred by the last convention to this Committee, which sees no other immediate means of increase than raising the annual dues of members to the same amount, or approximate thereto, assessed in former years;

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and which, if the federation acquires a sufficiently large membership to warrant it, might be again reduced.

Your Committee presumes that Section 12 of this report will induce probably as much discussion as any herein submitted; for the questions involved in it are apt to be regarded from two very different and sharply separated points of view. Some of the oldest and most successful practitioners would doubtless be willing to sacrifice personal feeling to the common cause, and to start in the new federation from the lowest rung of the associative ladder as the youngest; while some of the latter will be among the first to allow that as regards practitioners far advanced in life who have done the hard pioneering work from which has been built up the platform offering so secure and honorable a foothold to those beginning their professional career — some of these juniors will doubtless be among the first to allow that there would be not only great incongruity and unseemliness but positive injustice in substituting in the case of their seniors the insignia of a lower professional grade for those of the higher one which they have through the heat and burden of their long day borne with honor not only to themselves but to the Institute and the profession.

Respectfully submitted,

E. H. KENDALL, New York.
D. H. BURNHAM, Chicago.
T. P. CHANDLER, JR., Philadelphia.
T. M. CLARK, Boston.
A. J. BLOOR, New York.

THE ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

HOUSE OF E. P. BRADBURY, ESQ., BOSTON, MASS. MR. W. WHITNEY LEWIS, ARCHITECT, BOSTON, MASS.

[Gelatine Print issued only with Gelatine and Imperial editions.]

THROUGH an unaccountable blunder, while the name of the owner of this building was correctly printed in the text of last week's issue, it was incorrectly printed upon the helio-chrome plate of the doorway which appeared in that issue.

ST. PAUL'S CHURCH, BUFFALO, N. Y. MR. R. W. GIBSON, NEW YORK, ARCHITECT.

THIS church was destroyed by an explosion of natural-gas and consequent fire in May last. It is now being rebuilt, with considerable changes and improvements. The chancel is considerably larger in the new plan, and porches, vestries, etc., are re-arranged, and large tracery windows are introduced in the place of some of the lancet windows of the old building. The tower and spire remain uninjured. The interior was formerly without a clerestory, but with wooden columns and wooden arches supporting the roof. In the new design, stone columns and arches of masonry support a handsome geometrical clerestory, and the roofs are built at a higher level to accommodate it. The stone used is chiefly Medina stone, quarried in the western part of New York.

DESIGNS FOR A WROUGHT-IRON GATE.

THIS plate shows the prize drawings of the Fourth Competition of the Detroit Architectural Sketch-Club, the problem having been a design for a double-swinging wrought-iron gate for an office-building. First place was awarded to A. Kahn, designer of "Quill Pen"; second place to J. B. Nettleton, designer of "Jumbo"; third place to Rich. Mildner, designer of "Arm and Hammer"; and fourth place, G. Harvey, "Forge and Hammer."

THE PALAZZO APARTMENT-HOUSE, ST. PAUL, MINN. MR. A. H. STEM, ARCHITECT, ST. PAUL, MINN.

THIS building, owned by Messrs. J. R. McMurran *et al.*, at the corner of 10th and St. Paul's streets is now nearly finished.

HOUSE OF SENATOR PHILETUS SAWYER, WASHINGTON, D. C. MR. W. H. MILLER, ARCHITECT, ITHACA, N. Y.

THIS house now being built of dark brownstone with darker trimmings will cost $75,000.

AN ICE-SEALED RESERVOIR. — In a certain town in New Hampshire, which is provided with a supply of water for fire purposes, the water has been obtained from a reservoir about one hundred feet square, situated on an elevation near the town. During the winter, a fire occurred at a time when the reservoir was covered with ice nearly two feet in thickness. The water issued from the hose in very sluggish streams, which soon ceased altogether, and it was suspected that some obstruction had got into the pipe. Suddenly one wise man called several to accompany him to the reservoir. There, with their axes, they cut a hole through the ice, and at once an abundant supply of water issued from each of the hose attached to the hydrants. The ice over the reservoir was so strong that it did not permit the pressure of the air to be exerted on the water therein, and, therefore, the air-pressure at the nozzles would balance a head of water nearly thirty-three feet in height. But when the hole was cut through the ice, the pressure of the air could be exerted upon the water there, as well as at the nozzles, and the supply had the full advantage of the difference in height between the reservoir and the hydrants.—*Engineering.*

MISTAKES IN ARCHITECTURE.[1] — II.

EXAMINATION MISTAKES.

EVERY professional student has now to look forward, more or less, to examinations. There are many callings in which these have been pushed too far; happily, that is not the case, at any rate as yet, with architecture. We have, however, enough examinations and competitions for prizes to bring mistakes in examinations well within our scope this evening. The prime mistake is to go up unprepared, in the hope that one may succeed by a fluke; or, perhaps, in the mistaken belief that one knows the subject so well that no preparation is needed. I have had a rather long and rather wide experience as an examiner in architecture, and I can assure you that the degree of unpreparedness with which some candidates are content is perfectly astonishing. Perhaps a specimen of the worst papers I ever had to correct might be more amusing than impressive; but I am sure that many students of schools of art offer themselves for examination simply on the chance that by a fluke they may get through, and have signally and dismally failed accordingly.

In the case of the Institute Examination for the Associateship, or that for the District-Surveyorship certificate, long and careful preparation is needed, and for each of these a spice of practical training is wanted. The would-be Associate must have some practice in design, and must make himself personally familiar with some specimens of ancient architecture, and the would-be District Surveyor must have some experience of the supervision of building works. Similarly, where drawings have to be made with a view to prizes offered by the Institute or the Association, a candidate, in order to have any chance, and to gain any good from entering on the competition, ought to have some experience of drawing, and, if the prize be for a design, some notion of designing before he ventures to compete; though, as these are competitions, and not pass examinations, failure to succeed does not involve the same discredit, and ought not to have the same discouraging effect on the candidate as failure in a pass examination.

It is a mistake, let me very emphatically say, for any student attending the courses about to begin here to avoid the final examination or any intermediate examination. Of course, the prizes are only few, and, as far as they are concerned, the examination at the end of the session is competitive; but the certificates are given to as many as get more than a certain proportion of marks without limit of number, and so there is for each one a chance of having his ability and diligence recognized, and the opportunity which the class examinations offer of proving to yourselves that you have learned and retained a fair amount of what I try to teach is, in my opinion, of great value.

In the examination-room, it is a great mistake to fire off a piece of knowledge that has nothing to do with the question, simply because you know it; as, for example, suppose you have carefully got up the tracery of windows of different periods of English art, and no question is asked about tracery, but a question is asked about mouldings. If, in answering that question, you drag in the tracery and spend half an hour over it, you do more harm than good. No examiner who knows his work will give a single mark for statements that are irrelevant and do not answer any part of the question, so you get no marks for your tracery; meantime, the writing and sketches have wasted you half an hour, during which time, had you been answering other questions to the best of your ability, you would have been earning marks.

Next to the mistake of lugging in irrelevant matter by the head and shoulders comes the mistake of giving too much time to one or two questions. A paper in which there is no proportion among the answers is one very difficult to mark, but which, from the very nature of things, is sure not to get so many marks as one containing the same amount of writing and sketches, but where more questions are taken, and a clear, condensed, yet correct answer given to each. It is a mistake, also, in architectural examinations, not to illustrate the paper of answers by sketches whenever possible. If, unluckily, you cannot make tolerable sketches, it is very much to be regretted, and you had better stick to written replies; but, if you have any reasonable mastery of the pencil, do not forget to introduce sketches, and the better they are, the better your paper, and the higher will it be marked. It is a mistake — and one often made, I fear — to suppose that examiners in our professional examinations are anxious to trip you up, and that they lie at the catch and will be heartily glad if, by some clever and misleading device, they unfairly entrap you into a blunder. The object of the examiners is to bring out

[1] A lecture delivered by Prof. T. Roger Smith, F. R. I. B. A., at the commencement of the session 1888-89 at University College, London. Continued from No. 673, page 235.

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what you know and what you do not know, and it is with an anxious sense of serious responsibility that they carry on this important work. Rely upon it, they had rather be convinced that you are fit to pass than that you must be turned back. But rely, also, upon it that they will not pass you till they are so convinced.

Again, it is a mistake to suppose that any answer which is not wrong will do. If a question involves a difficulty, the answer which evades that difficulty is very differently considered from that which attempts it, even if it should fail to solve it perfectly. For example, in a recent examination I gave the dimensions of a bay of flooring fit to carry a certain weight per foot, and required an iron girder to be calculated of a fixed span, and strong enough to carry that bay. I got more than one reply in which the calculation was attempted, and was carried out on the right method; but the right result did not come out, owing to errors or omissions in calculating. I got one reply, in which, after stating the number of tons to be carried, the answer went on saying, "I should adopt a rolled-iron joist, so many pounds to the foot." This answer was probably arrived at by some rule-of-thumb method; it was not far from being practically correct, but there was no attempt made to work out the calculation, which was the difficult part of the question, and, of course, I could not give such good marks to this reply, which avoided the difficulties, as to those in which the students had tackled them to the best of their ability and by proper methods.

Architects' Mistakes.— We have now reached architects' mistakes, and there seems to be good reason for occupying such time as is left chiefly with mistakes in practice. Still, there are one or two remarks on design which I am tempted to hazard, and which, I think, can usefully be made. Remember, then, that it is a great mistake to attempt to use in designing what you do not understand. Just as in Egypt the captive Israelites could not make bricks without straw, so you cannot design without materials — *i. e.*, without being familiar with the forms, features, and ornaments of the style in which you are working, and with the manner in which those elements have been put together by successful architects before your time, and without, moreover, being practised in the application of that knowledge.

If you want to see examples on a large scale, numerous, costly, and distressingly instructive, of what making architectural bricks without this sort of straw comes to, just walk through the various streets and courts of the city of London. Side by side with some of the best buildings of some of our best architects you will see costly works, substantial and pretentious, designed by men who can have had no intimate knowledge of, and scarcely any training in, our art, and who have in most cases been employed because they were known to moneyed men as trustworthy surveyors. Such have doubtless built soundly, but their works are, architecturally, failures. Getting together this straw — to return to the old figure — is no easy task. It takes a long time and a good deal of pains to gather information enough, and to develop skill and experience enough, to make a really good architectural design, and to work it out in all its detail; yet it is unwise to start practice till this can be done. Sometimes circumstances or the offer of work render it almost necessary for a student of only a few years' standing to begin on his own account; but it is very rare for those who start prematurely to succeed in doing good architecture, unless they have the resolution, after completing their first works, to stop and go abroad and finish their studies, and then come home and resume.

I am tempted to add that a new style is a mistake; not that a new style is in itself impossible, but that it is impossible to you or me. It is idle to suppose that the genius of any one man could successfully work out a new style which his fellow men would feel to be appropriate. Looking round on the motley variety of styles which prevail in modern Europe, we are tempted to believe that it is a matter of no moment what style be brought in and used. Yet a little observation will show you that is not so. No architectural style is practised in England (to limit our notice to the country under our eyes), various as the styles that are or have been in vogue may be, unless its roots are deep and wide in the history or the sympathies of the English people. Greek, which was the style of our grandfathers' time, was welcomed at a time when every man of education in England was, or wished to be thought, a classical scholar. Scholarship is on the wane, and there is now scant encouragement for the practice of Greek architecture, though to learn it is as needful as ever. Italian Renaissance is intimately connected with modern as distinct from mediæval feeling and life, and has become universal in this, as in other countries of Europe, just because it is identified with that which England has in common with every modern European country. Gothic is the architecture which was a native of this country during the whole of the Middle Ages. Queen Anne is Dutch architecture, and belongs to a set of things which became incorporated into our national life at the Revolution, when Holland gave us a king. There have been, on the other hand, various attempts to introduce other styles with which there exist no such links, but the attempts have failed. For example, no permanent result followed the efforts of that most able architect, Owen Jones, to introduce Mahommedan architecture into this country — efforts in which he was virtually without followers. If there is any truth in these views, and I believe there is no gainsaying them, we have no reasonable ground for supposing that a new style could live and thrive, even if a great man had the genius to devise such a thing. If it comes it will grow, not be made.

Every apparent novelty in architecture should be viewed with great distrust, as more likely to be a mistake than a success. That novelty is both possible and desirable is self-evident, but beware of what seems to you to promise to be extremely and strikingly novel. It has, probably, been tried before, and given up as less good than the received way; or, if that be not the case, still there is great risk of its being the blemish, instead of the blossom, of your work — a mistake, instead of a discovery. The one defect of importance in St. Paul's Cathedral occurs at the crossing of the main avenue and the transepts — the one part where its great architect has departed most widely from the practice of other church-builders, and has, in the search for novelty, sacrificed more than he has gained, clever though the disposition of the piers that carry his dome undoubtedly is.

Mistakes in Practice. — In practice — that is to say, in the practically carrying on of the profession of architect — no more grievous mistake can be made — nay, I think, none so grievous — as taking bribes. An architect who accepts illicit commissions, or does nominal work for large fees, or who allows any other of the expedients by which receiving a bribe is made to look as if it were a business transaction to be practised upon him, has sinned against the very first duty of a professional man; he has sold that independence which ought to be his most cherished possession, and has put himself under the thumb of the very persons whom he ought to control. The wisest of mankind says, "A gift destroyeth the heart," and it is not possible to be more forcible, more terse, or more true. There are sure to be times when very specious proposals will be made to most of you, and when it may appear almost Quixotic to decline money which you sorely need; but whenever any case occurs in which you honestly doubt whether the transaction is one for you to agree to or not, I will suggest a practical test. Imagine yourself cross-questioned as to the entire affair by some such master of the art as Sir Henry James, before Mr. Justice Hawkins and a jury in open court, and if you at all doubt whether you would come off with credit, pray take that as an indication that the doubt is well founded, and the proposed transaction should be declined with thanks.

Anything that is in any way unfair is a mistake, as well as reprehensible. It is wrong; it is also bad policy. Believe me, there is no truer word than that "Honesty is the best policy." It is both dishonest and a mistake to get work away from a professional brother, or to undersell the profession by working at a rate below the recognized and fair rate, and it is equally a mistake to overcharge a client. Either of these may be expected to bring an inevitable train of bad consequences, a retribution, in its wake. It is, generally speaking, a mistake to work for nothing. You may occasionally do it in the case of charities in which you are interested, but I think a guiding rule should be not to do it in any case, except where the work is so in your own connection that under any circumstances it would come to you. To do work for nothing, and thereby deprive some other architect both of the work and the fees, is extremely bad.

I think there remains no worse mistake to note than temper. Temper is a mistake — a ship without a rudder, a horse without a rider, or a stream that has burst its banks, are apt illustrations of the condition of a man of business who has lost his temper. Above all things, an angry letter is a mistake. Make it a rule never to write a line while you are angry; for, somehow, an angry man's pen seems dipped in permanent gall, rather than ink, and his written words, unluckily, have not the same chance of being either promptly answered and then forgotten, or good-naturedly overlooked, that hasty spoken words often have. A letter written in heat is read, you must remember, in cool blood. If something raises your wrath, and you sit down and fire off a withering epistle, the best thing you can do is to put it in the fire there and then; the next best, to keep it twenty-four hours and then reconsider it; and the next best, to show it to a judicious friend.

One in high station, who had been much irritated, and had written a splendid and stinging reply, took it to the most influential man whom he knew. The chief — I think it was Palmerston — read it right through without a word. "Got a copy of this letter?" "No." "Not even a rough draft?" "No. I wrote it straight off." "Very injudicious letter. Much better burn it" — and, suiting the action to the word, the great man put it into the fire and coolly held it there with the poker till there was no shred left. That was the action of a true friend.

I must, at the same time, point out that just anger is not the same thing as giving way to temper. The ability to exhibit indignation at the right moment, if kept perfectly under control, is very useful to one who has to supervise works or direct men. The just anger of a superior is generally dreaded, and to an extent far beyond what one would expect or can quite explain. If, therefore, you are able at the proper moment to show an offending artisan, foreman, contractor, or tradesman that you are justly and with good reason roused to anger, it will generally help you in the control of the works under your direction.

My reference to an angry letter as a mistake makes it suitable here to add that we are liable to make mistakes by writing where we ought to speak, and speaking where we ought to write. Writing is quite permanent; therefore it is far more fit than our fading memories to record anything that should last. It is quite inelastic, quite unyielding; so it is unfit for anything of the nature of give-and-take. In all negotiations, explanations — above all, whenever there is a difficulty or ground for dissatisfaction — see people, at all

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sacrifices, in preference to writing them. At such times it is a mistake to write. On the other hand, if any specific order has to be given, if any definite objection or complaint has to be made, or if any agreement has to remain in force for any length of time, it is equally a mistake not to put it in writing. Your order, your complaint, your contract may often be originally done by word of mouth; but, in such cases, they should be afterwards repeated in writing, for accuracy's sake.

In architectural practice delay is a mistake. It is not always possible to be prompt, but it is far more possible than persons who habitually procrastinate are willing to believe, and from first to last it will greatly add to your chance of success if you are prompt. At the first inception of an undertaking, whether the client be eager or the reverse, it is equally prudent to do something at once. The eager client is baulked if he find nothing done after a short time — perhaps changes his mind as to doing the work at all, or more possibly changes his architect. The lukewarm and indifferent client, who might by a promptly-prepared sketch have been encouraged to go on, is disheartened, or turns to something else, or postpones or abandons his intention. Were I to trace the work of an architect all through, it would be easy to show that at every succeeding stage delay is a mistake, though I am bound to admit that it often can hardly be avoided.

Carelessness is another mistake, and one into which not a few men are apt to fall. The saying is attributed to Goethe, that "Genius is the art of taking pains." The common notion of genius is that it can do without taking pains. I do not ask you to accept this definition of genius as exact, but it covers half, and more than half, of the truth, and it would, I think, be perfectly true if you altered the wording and said, "The secret of success is the art of taking pains." Watch a successful man in the exercise of his art or pursuit, whatever it may be; you will see him all attention, all devotion to the business in hand. Consult an eminent physician, and you see by his questions, his air of concentration, his whole method, that for the time being your constitution, your ailment, and what to do for you in order to relieve you, occupy his entire and undivided attention and thoughts. It is chiefly this habit and power of concentration which has made his pursuit of medicine successful, has enabled him often to baffle disease and restore health, and has gained him reputation.

Read any good life of any prominent public man (as, for example, read Mr. Street's life lately published), and you will see what incessant, eager toil and watchfulness occupied every hour of his day, and his night, too. Nor is it less easy to remark in recreations that success can only be secured by great pains, however clever you may naturally be. Watch an angler who is known to be habitually successful, his keen attention, his constant thoughtfulness about tackle, flies, water, the long hours he will devote to fishing, and the eager pursuit of his game. A champion player in any athletic game, rowing, cricket, tennis, football, rifle-shooting — what constant practice! what a watchful eye for every turn of the game, every detail of the pursuit! Now if you are to be successful in architectural practice, you must set about it in the spirit, temper and method of Grace at his cricket, or Renshaw at his tennis, or a Queen's prizeman at his rifle-range.

It is, however, possible to throw one's self into the interesting part of a pursuit, and to remain indifferent to details that do not of themselves attract or that seem insignificant. This though, of course, better than being languid and careless about the whole business, is likely to lead to trouble. In the conduct of works, then, it is a mistake to neglect small matters, though it is equally a mistake to fuss. In every building there occur a certain number of apparently little points which must receive the architect's careful attention, but which one is naturally more inclined to leave to others or to chance than the questions that affect large parts of the fabric. The difference between the important and the unimportant does not, however, lie in their magnitude, or their cost, or their conspicuousness. The main walls are a costly part of the building, but they may be considerably damaged, decayed, or mutilated without a tithe of the inconvenience to the inmates which will occur if their chimneys smoke, their taps yield nothing but lukewarm water, their ovens will not heat, or the water runs off from their cisterns. The same thing is often true of the artistic effect of your work. You have, let us say, a Gothic church in hand, and labels over the windows springing from carved bosses. You carelessly place the bosses below the springing line instead of above it, or you in ignorance draw them so. That small blunder produces exactly the effects on the eye of a cultivated observer that would result to his ear from your talking about "hart" or "harchitecture," and, in its way, the proper placing of that one detail is as essential to the success of the design as the most ambitious or elaborate of its features. It is, therefore, a mistake to consider that any single thing essential to your building is unimportant or may be safely neglected.

There is, however, an opposite; fussiness is a mistake. It is fussiness to visit a building too constantly, or to interfere for the sake of interfering. You must not forget that if, as architect, you have the power of making alterations, every alteration, even if it be an improvement, means delay and expense, and that delay and expense are among the worst evils that can afflict a building. One of the most troublesome and unsatisfactory disagreements I ever had to unravel grew out of the architect, a man of real ability, having little other work in hand, paying a visit at least every other day to the works, and never going without ordering something to be done or undone. The accumulated effect of these orders was months of delay and claims without end for extras, while for all practical purposes the building would have been quite as serviceable if carried out exactly as shown in the original plans and specifications, without any of the modifications and improvements.

I am quite aware that one cannot expect people's minds to cease working when once a contract has been signed, and that it is proverbially "never too late to mend"; but, on the other hand, "you may buy even gold too dear." "A rolling-stone gathers no moss," and there are few improvements which are really worth the cost, delay and annoyance that come of interfering with a contract which has once been settled and accepted. In short, generally speaking, variations are a mistake.

Mistakes in dealing with your clients are especially to be guarded against, because they generally injure your prospects in life, yet they may occur in so many different ways that it is impossible to catalogue them. Many, if not most, instances of miscarriage between clients and their architects appear, however, to start from one root, namely, from mistaking the duty you have to discharge, or forgetting to keep up the proper relation of architect and client. Your duty may be described thus: to form a correct idea of what your client wants and wishes, and to do your best to obtain it for him. Your relation to him is purely professional, and not that of friendly intimacy, or equality, or good fellowship, or boon companionship. There are cases where an architect forms an idea of what a client wants, but one which does not correspond to his wishes, and then there is sure to be dissatisfaction. There are cases where an architect forms a notion of a client's wishes, but fails, till too late, to realize that it is not what he wants. The result again is dissatisfaction. There are cases in which the architect troubles himself little about either the wants or the wishes of his client, and works out what in his judgment they ought to be. Same result. Lastly, it has sometimes happened that the architect and the client, or one of them, have forgotten to maintain their intercourse on the proper professional footing, and if any cause of disagreement arises these cases end in the bitterest of quarrels. Professor Cockerell — a prince of architects — used to say to us, "Be a gentleman among artists and an artist among gentlemen."

As one illustration of, perhaps, the most common form in which this sort of misunderstanding of the architect's duties develops itself, I will take the case of a dwelling-house. The architect busies himself to learn what his client's wishes are, and he takes no small pains to put them into shape, and he, perhaps, designs something which is very near to what his client would like. But he neglects to realize exactly what his client wants. Let us suppose that his client is a man of moderate means, who cannot trench upon his income, and who has, let us say, £2,000 to spend, and that what he really needs is the best house that can be had for a couple of thousand pounds, all which his architect might have found out had he taken the trouble. When the lowest estimate for the design comes in at over four thousand, the whole thing is abandoned in chagrin and disgust, and the architect too late realizes that he ought to have found out what his client needed as well as what he wished.

The relationship between client and architect involves the necessity sometimes of very plain speaking, and the more thoroughly professional the bearing of the architect has been, the more thoroughly is it possible for him to discharge this sometimes painful duty with perfect effect. For example, in the case I have suggested, had the architect quite realized the case, he would at some period have had to say, "You cannot within the limit of expense that is prudent build anything either so ornamental and so roomy as you want; the design must be plain, some rooms given up, and the others kept small," and so on. Whenever any such necessity arises, believe me, it is a mistake to shirk or postpone the unpleasant duty. Meet it squarely and fairly and with good temper.

In dealing with those employed on your work, it is a mistake to suppose that every contractor, tradesman, or artificer is a thief or an extortioner, and every quantity-surveyor a kind of contraband agent. I have put it strongly, but the suspicious temper of mind at which this remark points goes sometimes far towards a tone of feeling as exaggerated as this. The fact is, that your contractors and tradesmen are engaged in one of the most complicated and difficult businesses possible. Their motive for carrying on the business is to make a profit, and you should look upon it as a matter for sincere regret if a profit is not made by the contractors on your works. You and they are engaged together on the difficult task of erecting a building, and if originally you know them to be respectable, by all means treat these people as coöperating with you, and aiding to give reality to your designs, which is their real position, and do not suspect unfair dealing till some proof of it begins to show itself. Such a course will be much nearer the fair and proper mode of administering a building. While I recommend this tone of mind, I do not recommend that you should cease to be vigilant and careful. It would be quite as great a mistake to abandon watchfulness as to abandon confidence gratuitously, and it would be a departure from the line of conduct which your duty to your client prescribes to you. It is, perhaps, hardly necessary now to say anything about quantity-surveyors, but I know that when I began practice, there was a kind of uneasy feeling in the minds of some of us, as though quantities were a kind of illicit trading, and those who prepared them akin to smugglers. If any of you share these notions now, permit me to assure you that they are a mistake, that the profession of a quantity

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surveyor is a most honorable and confidential one, and that the work they do is now indispensible to the conduct of building operations of any magnitude or complexity, and the assistance they render to the architect very valuable.

This mention of contractors and surveyors will serve to introduce another subject that should be noticed. It is for a beginner a mistake to employ second-rate or unknown men, either as builders, manufacturers, or quantity-surveyors. When you have established your position and gained a reasonable amount of reputation and experience, do as you like, but in early days you cannot afford to employ people who are not first-rate. It is of vital importance to run no risk of failure in your early works, and the employment of thoroughly reliable persons will greatly diminish that risk, and their known position and trustworthiness are a great safeguard and help to you if any part of their work should go wrong; and to some extent the same caution is a prudent one as regards new materials and untried modes of construction. A fortunate accident in the very first matter of any importance ever put into my hands revealed to me the value of employing known men. The work came from a man of business in the country, and I was, I know, looked upon with distrust by his London agent, who saw me for him, as young and untried. Fortunately, after making out some drawings and a specification, I got an estimate from a contractor of good repute, and I well remember how, when I went with the whole to my new client's agent, his face brightened up when he saw the signature of a man whom he knew well as competent and trustworthy, and by whom, ultimately, by and by, the work was excellently done. I urge this the more because young men often are more exposed to the temptation to get their work done in the very cheapest way than they will be in after life.

It appears to me to be as much a mistake for a practitioner of architecture to isolate himself as I earlier pointed out it is for a student. If there be no suitable associates within reach it cannot be helped; but in nine cases out of ten there are brother professional men available. Just as you, gentlemen, as students, can learn a great deal from one another, and will lose much of the stimulus and encouragement which make work go well if you do not in some way work in company, so in after life also you will derive great benefit and great pleasure from the society of those who are working at the same profession as yourselves, pursuing the same aims, encountering the same difficulties, delighting in the same studies; and you will be able to render assistance to your professional friends as well as to receive it from them. There are many circumstances under which two architects have to meet as representatives of two clients differently affected by some building operation. You can hardly imagine till you have had experience of it how much better all this class of business is got through if the two professional men know one another; or if even they only know each other as members of the Institute or of the Architectural Association, or in some such relation, than if they meet as absolute strangers. There are also many circumstances in which it is of inestimable importance to an architect to be favorably known to the members of his profession, and I strongly urge you all to begin in this class-room and the Association and Royal Academy schools to work together, and in after-life to belong to the Institute, and not only to belong to these societies, but give some attention and time to their work. An architectural hermit is a mistake.

It is not necessary, I hope, for me to offer proofs that most of the mistakes named deserve the name. I think your own good sense will have recognized, as we went through them, that they merit, each of them, a place in the list of things to be avoided. Some of these mistakes I have myself made, and have found to my own cost that they are what I have described them to be. Others I have happily escaped, but I have seen them made, and know that their consequences are not good.

To steer clear of every error is impossible, but what I wish to say is that good sense, right feeling and thoughtful attention to your work will go far to preserve you from any very serious slips. Years ago a pupil of mine acted as clerk-of-works on a job of mine where there was a great deal of masonry, and something which he told me about that masonry seems to convey a lesson. He noticed that some of the masons, as soon as they got a block of stone out of which to cut a feature of the building, set to with mallet and chisel, and in ten minutes were hard at it. Others would spend an hour or two, or possibly a whole morning, studying the block of stone on every side, considering exactly how best it could be utilized, and, in short, laying out their work before they put their hands to it. The men who made mistakes in their work were masons of the first group, not of the second. Perhaps this observation may suggest to us a method by which we may avoid mistakes in our work.

A Tall Chimney.—What is described by American papers as probably the tallest chimney in the world is being completed at East Newark, N. J. The diameter at the base is 28 feet, and the ultimate height of the brick structure will be 310 feet, with a diameter at the top of 9 feet. A cast-iron rim 20 feet in diameter and a bell surmount the whole, and will make the total height of the chimney 335 feet. In its construction 1,700,000 bricks were used, and the total cost will be $85,000.—*The Builder*.

MEDIÆVAL HOUSES.[1]—VI.

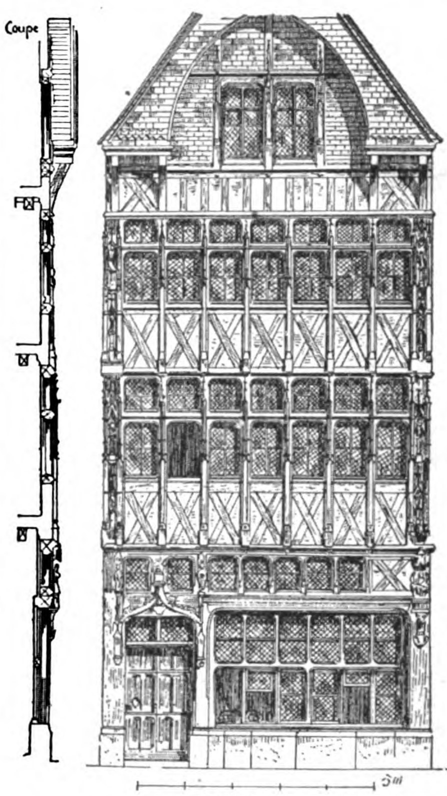

Fig. 28.

THE tendency of the northern cities was always toward more open fronts. At the end of the fifteenth century they had become perfect lanterns, as in the example here given (Fig. 28), the exact reproduction of a house in Rouen. Only the cross-braces interrupt the succession of wooden panels finished everywhere with the perfection of joinery. At this period wooden constructions begin to lose the character of carpentry and to take on the semblance of great pieces of furniture.

In Figure 28 fillings of masonry between the timbers are still apparent, but they soon disappeared behind panels of joinery and the whole front showed only a collection of wainscotings.

After this design were built many of the houses of the end of the fifteenth and the beginning of the sixteenth centuries.

Figure 29, which is a portion of the dwelling of the Abbot of St.

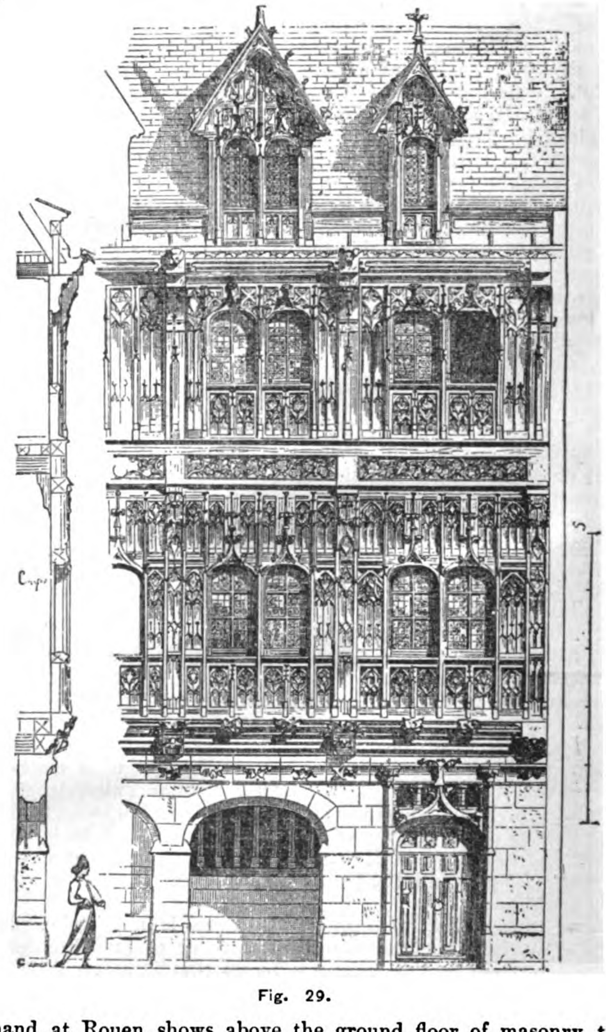

Fig. 29.

Armand, at Rouen, shows above the ground floor of masonry, two stories of wood, entirely covered on the outside with carved wooden

[1] Translated from the French of Viollet-le-Duc, by Mr. A. B. Bibb. Continued from page 223, No. 672.

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panels. When, a little later, with the Renaissance, the use of stone was resumed, this custom was so firmly rooted that they still built a great number of wooden houses, in which, however, are found pillars and bands whose forms do not belong at all to wood construction. In the street of the Grosse Horloge, at Rouen, may be seen two houses of this class covered with costly details. Figure 30 gives a part of one of them.

The sixteenth century witnessed the building of a number of these pretty houses, a last reflection of the art of the Middle Ages. After the disasters which occurred at the end of this century, dwellings returned to a simpler style, while the plans were very slightly altered.

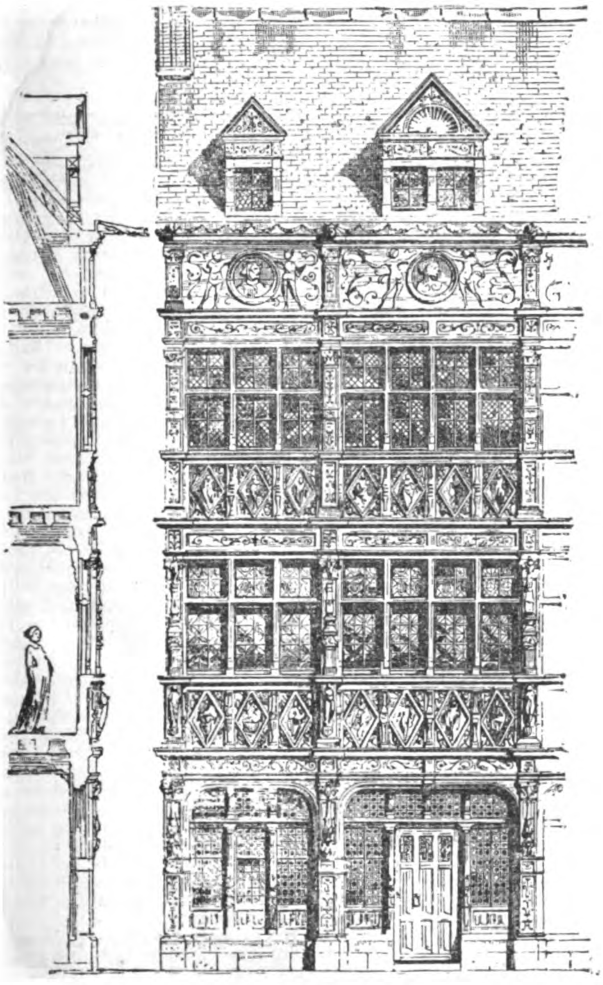

Fig. 30.

Many houses in the reigns of Henry IV and of Louis XIII reproduced exactly the plans of dwellings of an earlier period. It was not until the reign of Louis XIV that the houses (we do not speak of *hôtels*), began to lose their exterior character and to display only plain walls or wooden panels filled-in with rough-cast, with square windows and very little to attract the eye. At this time, also, the plan of the interior was decidedly changed. The place of the halls, which we have found in all dwellings, until near the beginning of the seventeenth century, was used for chambers. Interiors were more divided, each member of the household being assigned to separate quarters, and the custom of a life in common disappeared.

From the strikingly individual character of the city dwellings already treated in this article some interesting inferences may be drawn. We are among those who believe that the moral force and vitality of a people are more or less the result of individual responsibility. True civilization, fertile and active, is that in which the citizen preserves the fulness of his own individuality.

The theocratic and despotic civilizations of the East have shone with temporary brillancy for a time only to be thrown down never to rise again. In those civilizations the citizen has no place; below the sovereign and the theocracy or aristocracy there are masses of men whose passage through life is marked only by immense monuments created by their labor, like those of Egypt, India and Asia Minor.

Under such a state the *house* does not exist, between the palace and the hut there is nothing intervening, and the huts are all alike.

The Northern warriors emigrated into the West, bringing their families in great chariots, actual houses on wheels, which they fixed to the soil where the tribe conquered. To these races, the Greeks of antiquity at their head, it was given to build *houses*, dwellings indicating the habits and tastes of individuals, changed little by little by the changes affecting these habits and tastes. The feudal system, though imposed upon France by conquest, and opposed to the traditions of the Gallo-Romanic population, did not suppress individuality and personal responsibility, but, on the contrary, developed with energy these natural tendencies of the Western people. It brought about the struggle for permanent government and left, as a last effort against oppression, the employment of feudal mechanism itself; for the victims of the oppression of the lords could always apply to the sovereign and each municipality, by throwing in its fortunes with the party of the bishops or of the barons, or repelling both, by renewing allegiance to the sovereign, could make a last appeal against tyranny. This condition was certainly not indicative of an orderly and civilized government, as we understand those terms, but it was not opposed to the intellectual development of the individual, who was in the towns of the Middle Ages a distinct factor in the social problem, and whose domicile preserved a definite, recognizable character. The absolute government of Louis XIV stifled almost entirely this sentiment, so actively felt up to the end of the sixteenth century, and the house of the French citizen of the seventeenth century had lost all its individual character. Uniformly built, uniformly lighted and arranged, it absorbed the citizen, who lost as he entered there all individual physiognomy and no longer knew himself, except by the number of his house and the name of the street.

In England, where the feeling of personal responsibility and individual distinction is much stronger than in France, the inhabitants of large cities have preserved the separate life of the families and seldom follow the system of mingling several families in one dwelling. This appears to us to have a moral significance of the highest importance, and it is not without a lively satisfaction that we see this feeling of family distinction, of individualism, reviving and reacting against the enervating system introduced in France under the government of Louis XIV. Each one wishes to have his own house, and while the large majority of the inhabitants of our great cities cannot satisfy this ambition in town, they can at least escape the disagreeable conditions of a common dwelling by building those myriads of small houses which fill all our suburbs and in which families of small means can pass a great part of the year.

It will be one of the glories of the present government of France to have taken the most radical means to promote this healthy tendency, for, in our judgment, a country cannot call itself morally civilized until the day when each citizen may possess his own dwelling in which to rear his family and leave behind him some remembrance of the good he has done or the services he has rendered his neighbor. The walls speak and the man who would do an evil action in rented lodgings which he is to vacate in six months will hesitate to sin between the walls of his own and his children's home.

The hotels or city houses of the lords and wealthy commoners occupying extended spaces and surrounding courts and even sometimes gardens, did not affect the defensive arrangements of the seignoral palaces and were not provided with towers and battlemented walls. As we said in the beginning of this article, the hotel had not usually its living rooms, but oftener the servants' quarters and offices and sometimes only a plain wall with a small entry door upon the street.

The merchants as well as the common people mingled in the daily life of the street, a necessity for the most of them, while the nobles and the nabobs who maintained large retinues, shut themselves up in their city homes and lived an isolated feudal life, holding no regular communication with the outer world. These houses were naturally more subject to change than those of the common people. Occupying larger spaces and belonging successively to rich owners, they were altered with the fashions of the day. We find in France no hotels of a date prior to the fifteenth century, or, at least, the ruins of those of an earlier period which remain to us are of mediocre value. One of the oldest of them, still to be seen at Provins, belonged to some rich canon of Saint Quiriael and is composed of two distinct groups of buildings separated by an arched passageway (Figure 31). To the left is the great reception *salon* on the first story, reached from the court by an outside wooden staircase. Three double windows pierced the front toward the church and lighted this room; it was warmed by a great stone fireplace and wainscoted with woodwork apparently panelled "en berceau." On the right of the passage are the kitchen and two rooms between the court and the garden which served as living rooms.

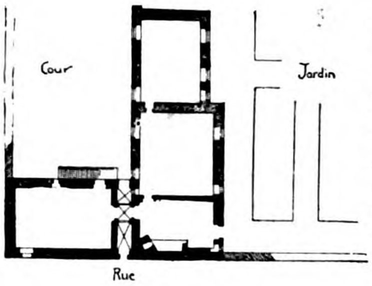

Fig. 31.

[To be continued.]

COMMUNICATIONS

THE TARIFF ON IRON-BEAMS.

TRENTON, N. J., November 10, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs, — In your leading article of October 27th appear some

statements which, even though it may cause you some mortification to have the ignorance or carelessness of the writer thus noticed, should be corrected.

The article states "One hundred kilogrammes is two hundred and sixty-eight pounds." The truth is that 100 kilogrammes equals 220.5 pounds, and this error effects all the subsequent calculations. The article says: "We do not know whether the United States Custom House calls a ton two thousand or twenty-two hundred and forty pounds."

If the writer had informed himself of the facts he was discussing he would have learned that the duty on rolled beams is not levied by the ton at all, but is one and one-quarter cents per pound.

I quite agree with the statement in the article in question that "while the matter is under discussion it is important to have the facts correctly stated" and hope you will see that this is done. It does seem to me that an editor owes it to his readers to understand that which he is writing about before he undertakes to instruct the public.

I enclose copy of a letter I addressed to the Editor of *The Times* stating some facts which bear on the subject and which may interest you. Yours truly, Fred J. Slade.

[As is shown in the rather more polite letter published last week, our error came from using the coëfficient for transforming kilogrammes into Troy pounds, instead of that for avoirdupois pounds — an illustration of the advantages of having two or three different sorts of pounds in common use which has a certain value. Otherwise than in this, which makes a difference of twenty per cent or so in the results, we do not find such evidences of ignorance or carelessness in our modest screed as to cause us severe agonies of mortification, and we think that if our correspondent will look at the Revised Statutes of the United States he will find the duty on rolled-beams stated exactly as we quoted it, and not as he describes it, although twenty-eight dollars a gross ton, and one and one-quarter cents a pound, are of course equivalent. As to the substance of our article, we do not see that either of the letters affect our main point, — that the New York daily papers have not put strongly enough the case of engineers, builders and owners who use rolled-iron beams, in stating that the duty amounts only to eighty per cent *ad valorem*. Instead of that, it is, even with avoirdupois pounds, about one hundred and twenty per cent on the Belgian price, and the latest advices indicate that the foreign prices are falling, and the duty consequently rising. In the copy of his letter to the *Times* which Mr. Slade is obliging enough to send us, he enters into a long discussion about the merit of the system of paying "American rates of wages, American rates of interest, American salaries, and American prices for American goods," and, we might add, American profits to American combinations. As our ignorant and careless mind does not venture to soar into the realms of political economy, but only trots around in its own narrow circle of practical experience, we will not attempt to discuss the theoretical question, but we must confess that we cannot see how American interests are benefited by keeping the price of those all-important building materials so high, that it is cheaper to get them in Belgium, pay foreign insurance and brokerage, and hire foreign steamships to bring them over, than to buy them of our friends and neighbors, or, perhaps we should say, of the foreign owners of our mills, who are amiable enough to hire some of our friends and neighbors to work for them, if they cannot get any one else to do the work more cheaply. — Eds. American Architect.]

COMBUSTIBLE STEAM-PIPE COVERINGS.

Boston, Mass., November 21, 1888.

To the Editors of the American Architect:—

Dear Sirs, — The composition for non-conductor of heat of steam-pipes, described on page 226 of the *American Architect* of November 17, answers its purpose very well, and has the advantage of cheapness.

I saw the receipt in an English paper some twenty years ago, and have used it and suggested its use to many others; but a recent experience in regard to its combustion has caused me to abandon both its use and commendation.

The cylinders of a very large engine in a mill in Lawrence were protected by this covering, and on the 11th of last September the covering was found to have been set on fire by the heat of the steam. The fire gained sufficient headway to cause the automatic sprinklers in the room to operate, and they were the chief agents in extinguishing the fire.

Although this is the first instance that I know of its combustion, yet I believe the circumstance to be of importance enough to cause the abandonment of this material for use where any hazard can result from its ignition.

There are a large number of steam-pipe coverings in the market which are composed of combustible material, and which are set on fire from time to time by the heat from the steam-pipes. It is impossible to define the exact conditions under which a steam-pipe can produce fire. There are numberless instances where combustible material has been in contact with steam-pipes heated very hot, without ignition; and, on the other hand, there have been instances of ignition caused by steam-pipes at a pressure as low as seven pounds to the square inch, and in one instance to my knowledge by the boiling solution used in bleacheries, which could not reach a temperature of over 232 degrees Fahrenheit.

It is, however, well known that there are a large number of incombustible and inorganic substances which are efficient protectors against radiation, and, therefore, questions of economy do not render it necessary to use combustible material which may be ignited by the heat from the steam-pipes. Very respectfully,

C. J. H. Woodbury.

Vienna's Walls to be Taken Down. — The Viennese are in great delight at the prospect of seeing the Linienwälle or boundary walls of the city demolished. These walls, making a complete circuit of the capital and girt by a moat, were erected during the last century, while Vienna was still afraid of Turkish invasions. They were not fortifications, but merely a barrier against assaults, encircling the regular fortifications, which rose about three-quarters of a mile from their gates. The razing of the fortifications was decreed thirty years ago, and it is to this improvement that Vienna owes its superb Ring. Railways and new boulevards have also swept away many portions of the Linienwälle but the circuit is still marked by gates where octrol dues are levied, and it is to these imposts, rather than to the crumbling fragments of walls, that the Viennese object. Yesterday in inaugurating the new park at Währing the Emperor hinted that the fortieth year of his reign might be signalized by the removal of the walls. To-day the happy citizens are concluding that the octrol duties are about to disappear too. This, however, is by no means sure, for the Town Council draws 12,000,000 florins a year from the duties on food and drink which it levies at the city gates. — *The London Times.*

TRADE SURVEYS

The chief unsettling factor at this writing in trade and manufacturing circles is the uncertainty as to the probable volume of business that will be placed in the manufacturing establishments throughout the country. The full confidence that exists in favor of a large volume of business is helping to maintain prices at a high level. Manufacturers of all kinds entertain the opinion that whatever delay will be shown by consumers and distributors and projectors of work in placing orders is simply an act of prudence. They believe that in a very short time a large amount of business will come to their shops for winter execution and spring delivery. There is no sound reason for explaining the correctness of this belief. If there were any its chief cause would be in the railroad situation. While gross earning as it has often been pointed out, are large, net earnings are small and railway managers have less confidence in their ability to harmonize their conflicting interests in harmony with the interstate Commission law. A movement will be undoubtedly made in Congress to secure some modifications of this law by which the intense friction created by this law can be lubricated. If railroad managers were able to live in harmony and increase their net earnings it would have an important bearing upon railroad building during 1889. It is not probable that Congress will modify the law notwithstanding the powerful railroad influences that will be brought to bear, to bring about such modifications. Whether any modifications are absolutely needed is uncertain. Some railway systems are certainly suffering but the law makers know the strong feeling among the masses of the people against any mistaken leniency to railroad managers and they will not be quick to obey the behests or listen to the importunities from those who are now suffering from this law. Just at this hour it is impossible to say whether there will be much less railroad building on this account or not. On Monday of this week the Pennsylvania Railroad Co., contracted for 45,000 tons of steel rails at $28.00 per ton, to be furnished by three rail-making companies in the State of Pennsylvania. This, it is thought, will induce the placing of a large number of orders by managers who have been watching for the cue from those whose judgment they had every confidence in. If there should be an active demand for steel rails it will materially help all the dependent interests. Reference has heretofore been made to the active demand for machinery, mill and shop equipments for ships, locomotives, lake-craft, rolling-stock, tools, etc. All the statements made do not represent the magnitude of the inquiries made or the requirements which exist. It is uncertain how much of this business will be placed within any given time.

The anthracite coal producers have had things their own way in the price of coal but they are now brought face to face with a reduction which they cannot control or resist except in restricting production which they will probably do on the first of December. This year's production will probably reach 37,000,000 tons. The largest output ever reported. Consumers throughout the region of country supplied with anthracite are all better supplied than they ever have been at this season. There is a very active demand for bituminous and the miners of coal are opening mines and increasing facilities for supplying customers next year. The textile manufacturers are very much encouraged by the orders for goods that have come to hand within the past two weeks. Southern textile managers are speaking hopefully of their success in selling the larger part of their winter's production. This is calculated to still farther increase the building of factories in the South. Fall River manufacturers are able to declare good tidings. A considerable expansion of capacity is now contemplated. Boot and shoe manufacturers have settled down to accept present prices for the next spring's goods and business has improved. The strong points in favor of the expansion of industrial operations next year, are the abundance of money, low rates of interest, the confidence of capitalists in the ability of Western and Southern borrowers to pay their loans; the strong probability of considerable railroad building which will probably reach three thousand miles more than this year, the development of a great many mines, the building of a number of small industries in the West; the condition of labor with regard to wages and hours of labor and a generally satisfactory account of investments in almost all channels. Labor organizations will not likely endeavor to unsettle existing friendly relations with employers but it is to be remarked that organizing is being pushed not only among the knights but among the old-time Trades-Unionists. Labor organization is making every effort to increase its strength, readers of newspaper comments must not take it for granted that the Knights are on the eve of dissolution but while it must be admitted that in the point of number it is weaker, it is in reality stronger in the fewer numbers of earnest men than it was in the hundreds of thousands whose only motive was to strike. The federated trades are stronger than they ever have been and it is their intention if possible at their next Convention to formulate and demand and endeavor to carry out the inauguration of the eight-hour system. Labor is stronger to-day than for years. It may be divided into an army of regulars and an army of volunteers. The volunteer side are those who have been members and have withdrawn, and of those who have never identified themselves with organization but who are willing to use all their powers in the cause. The various wings of the labor party understand each other better. Too much importance should not be placed on the allegations and factional contentions. Considerable disturbance exists but it can be easily silenced. Those who are now apparently the enemies of those in power will become their staunchest friends and supporters.

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ST PAUL'S CHURCH, BUFFALO, N.Y.
VIEW OF BUILDING AS NOW BEING REBUILT.

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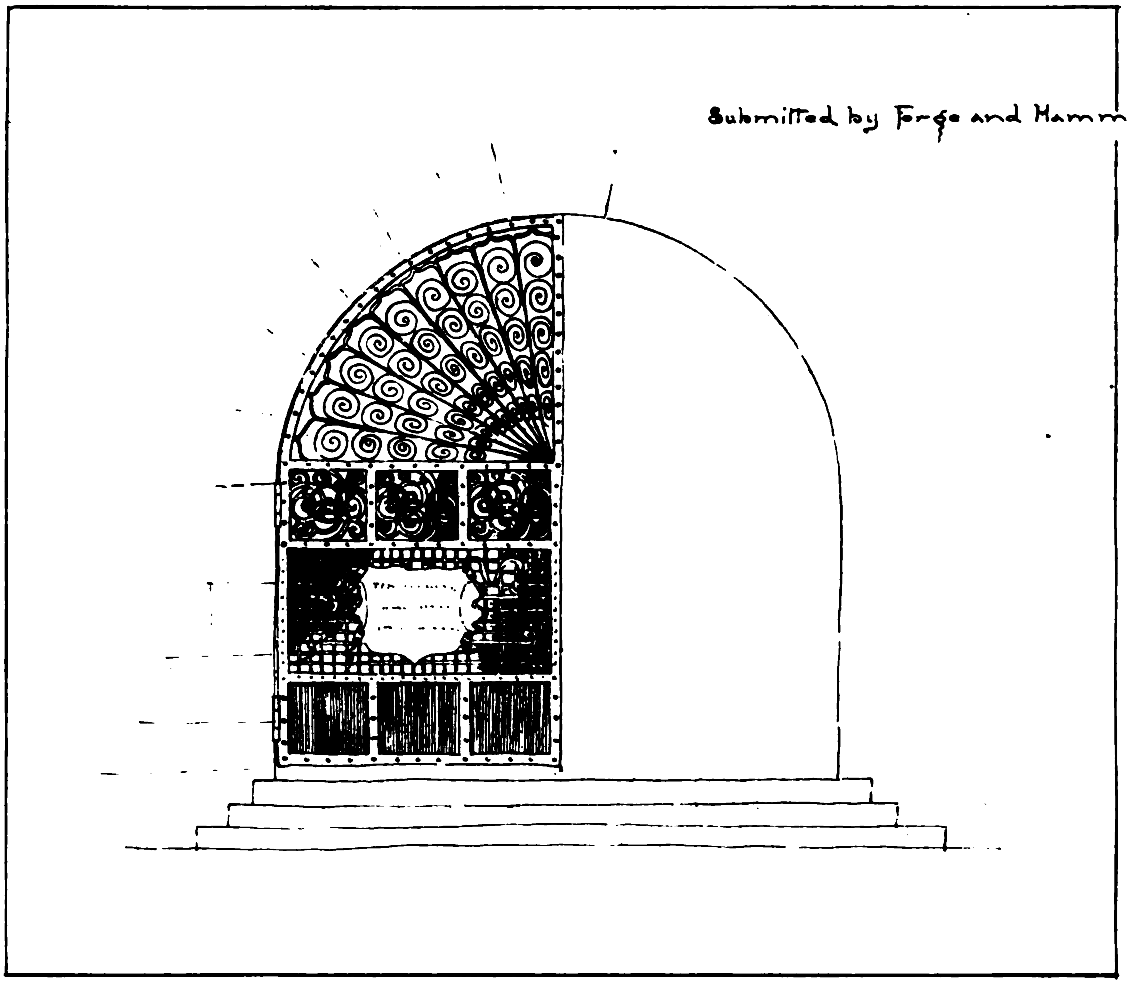

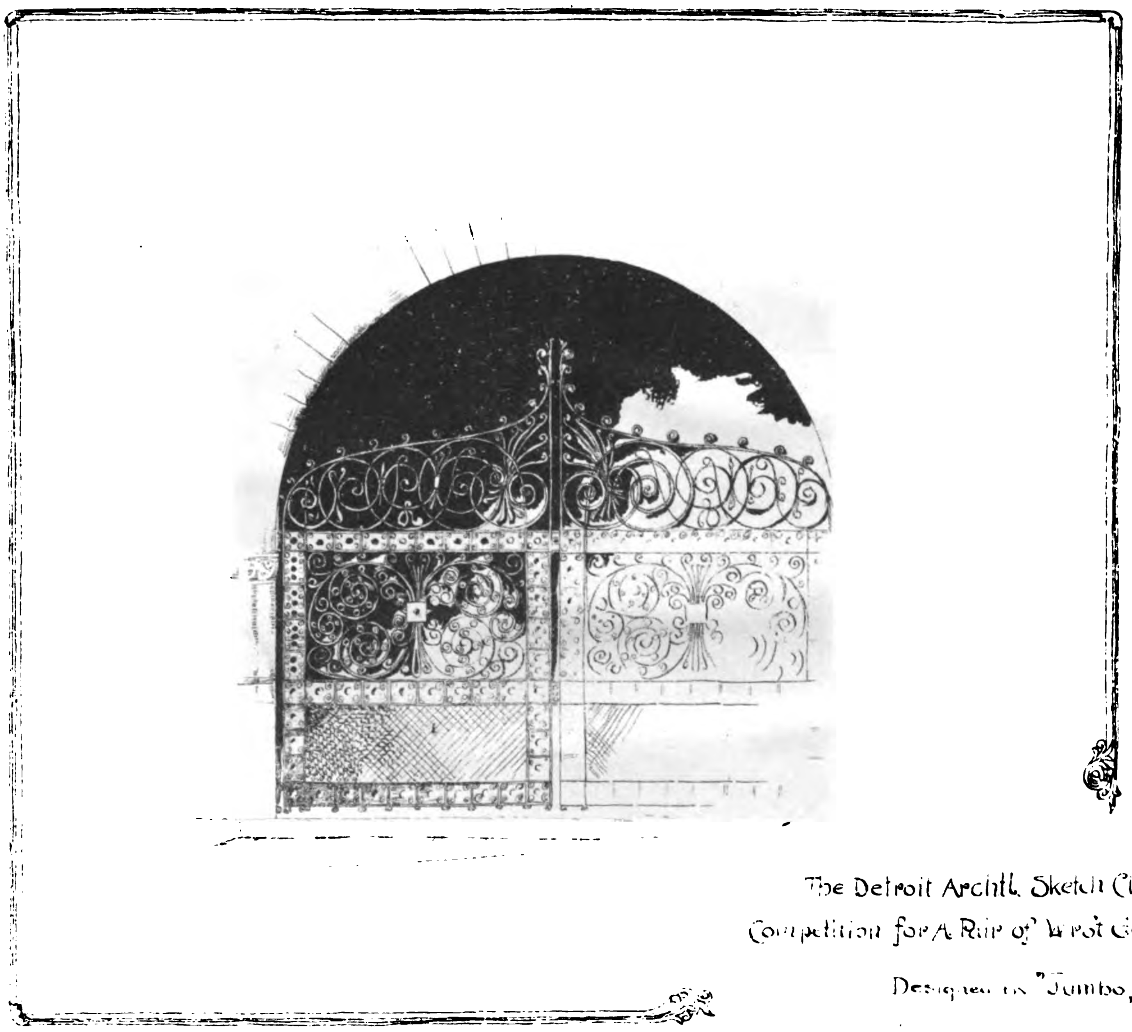

The Detroit Archtl. Sketch Club
Competition for A Pair of Wrot Gates
Designed by "Jumbo"

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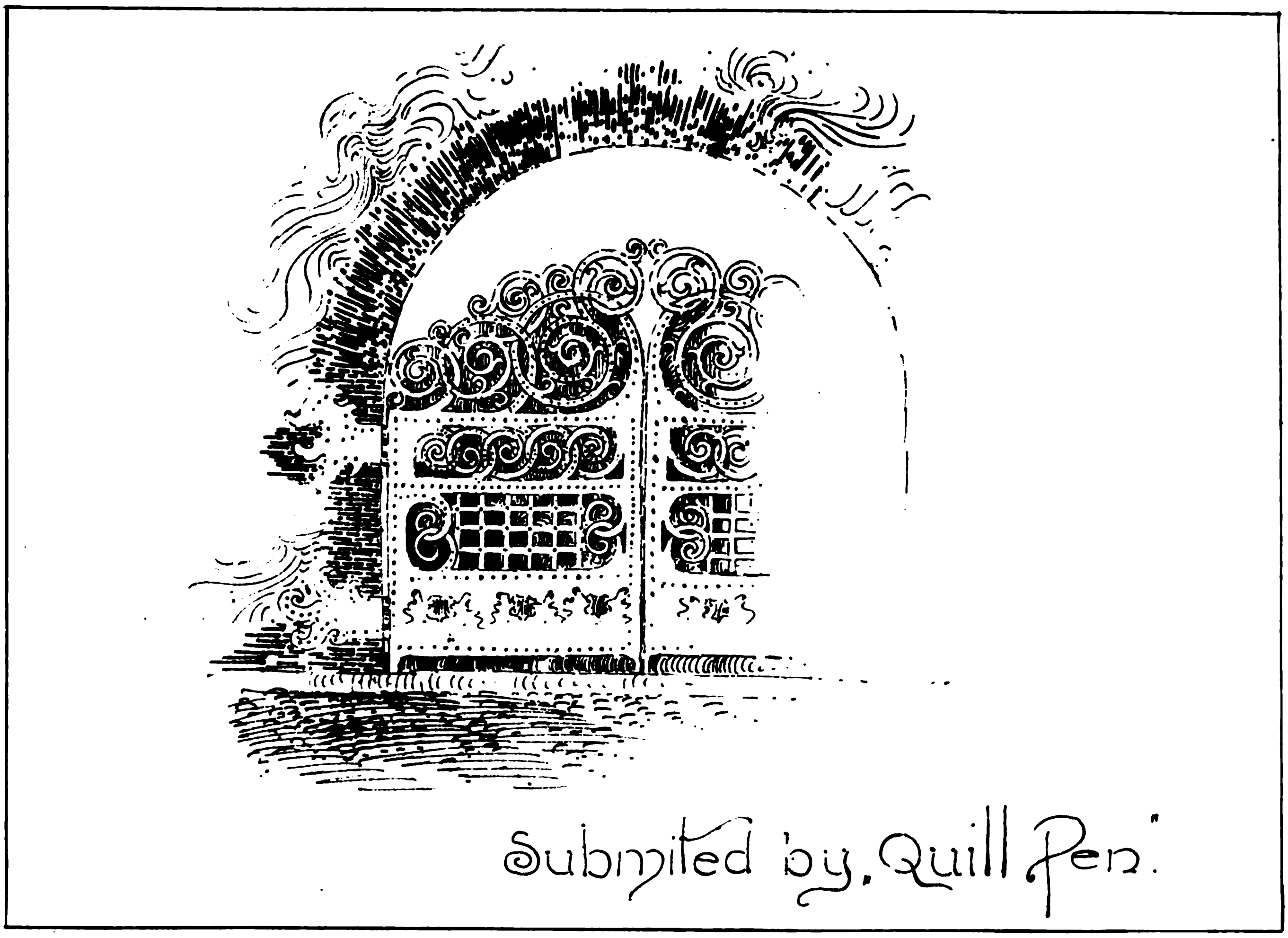

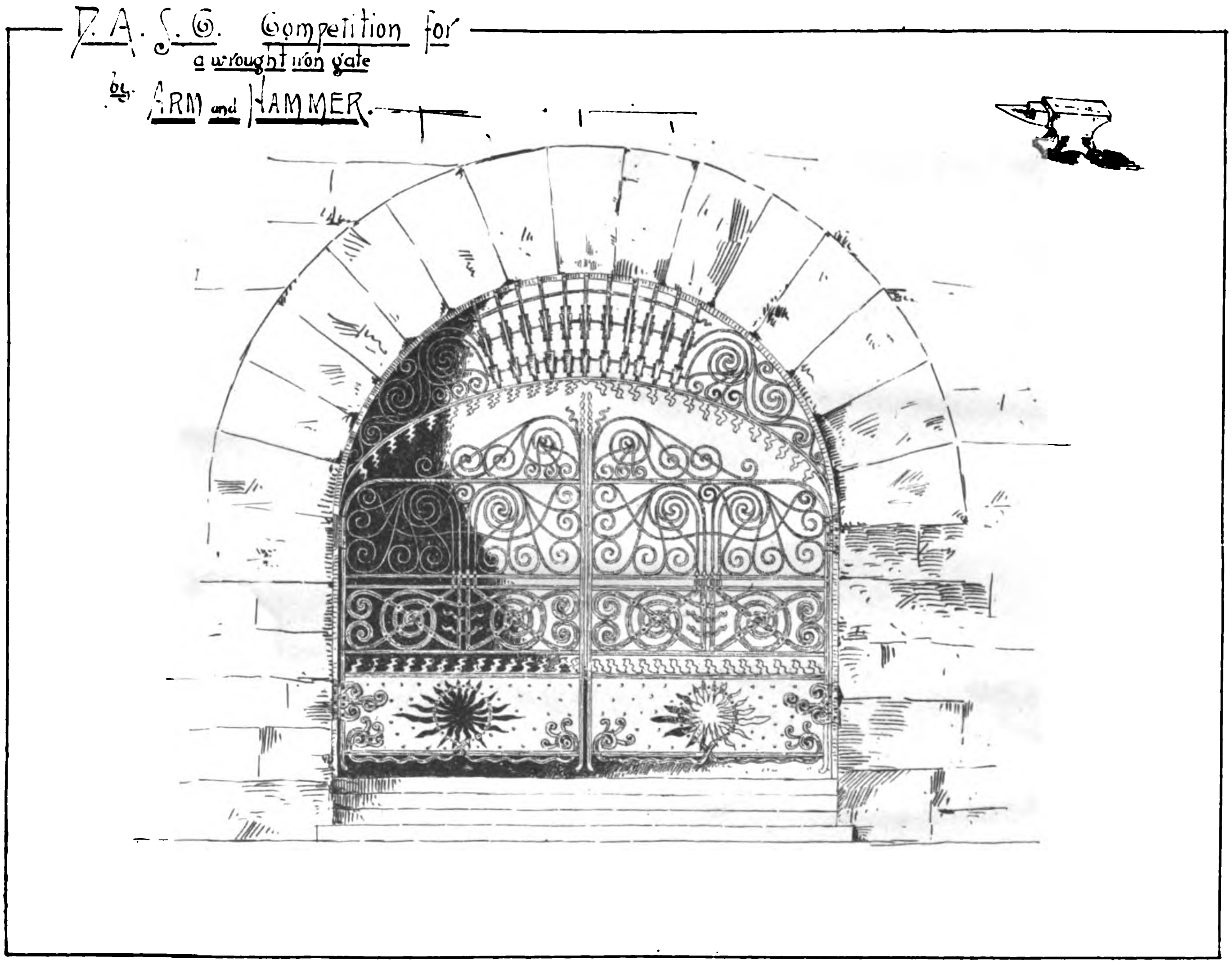

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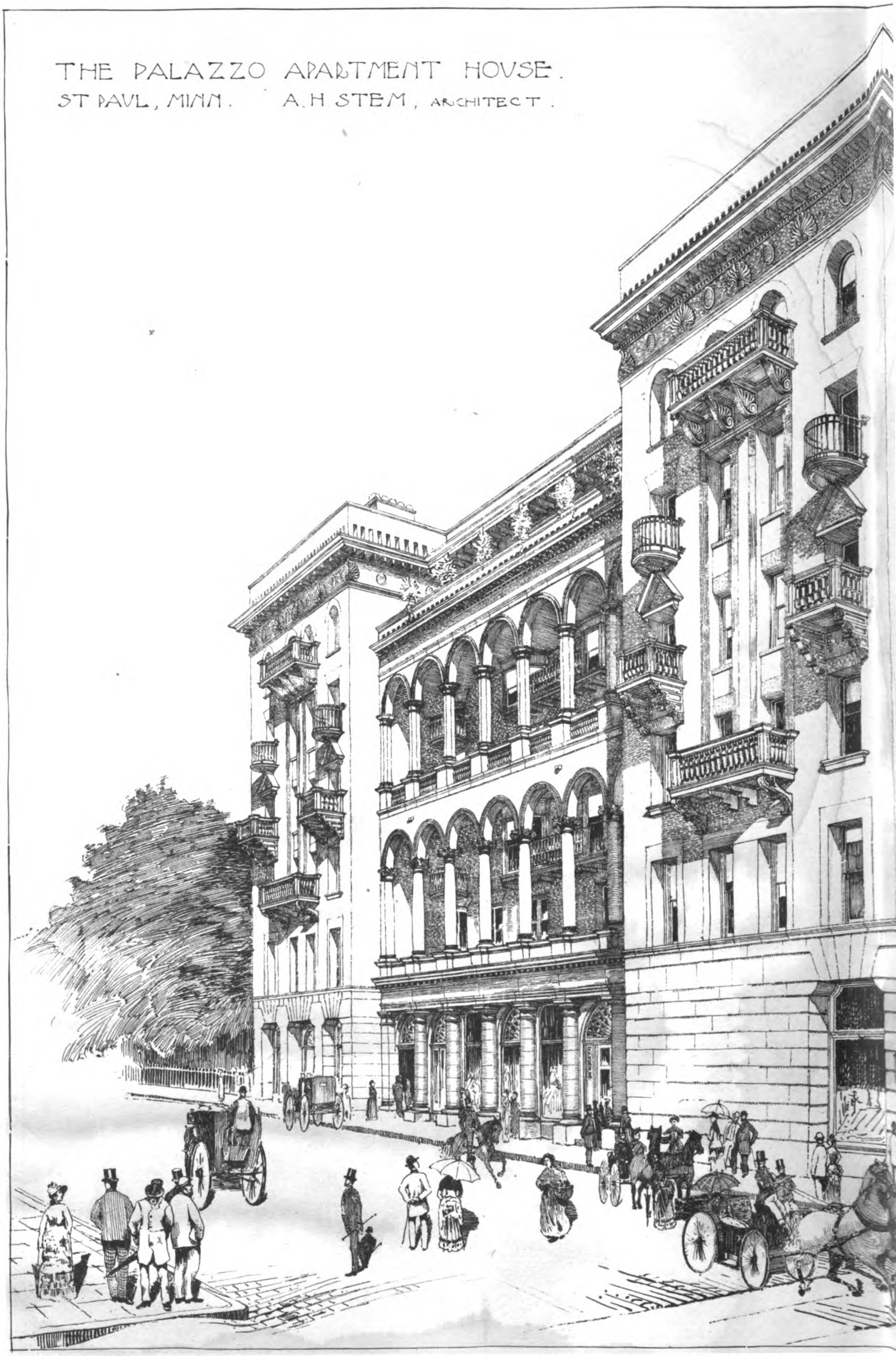

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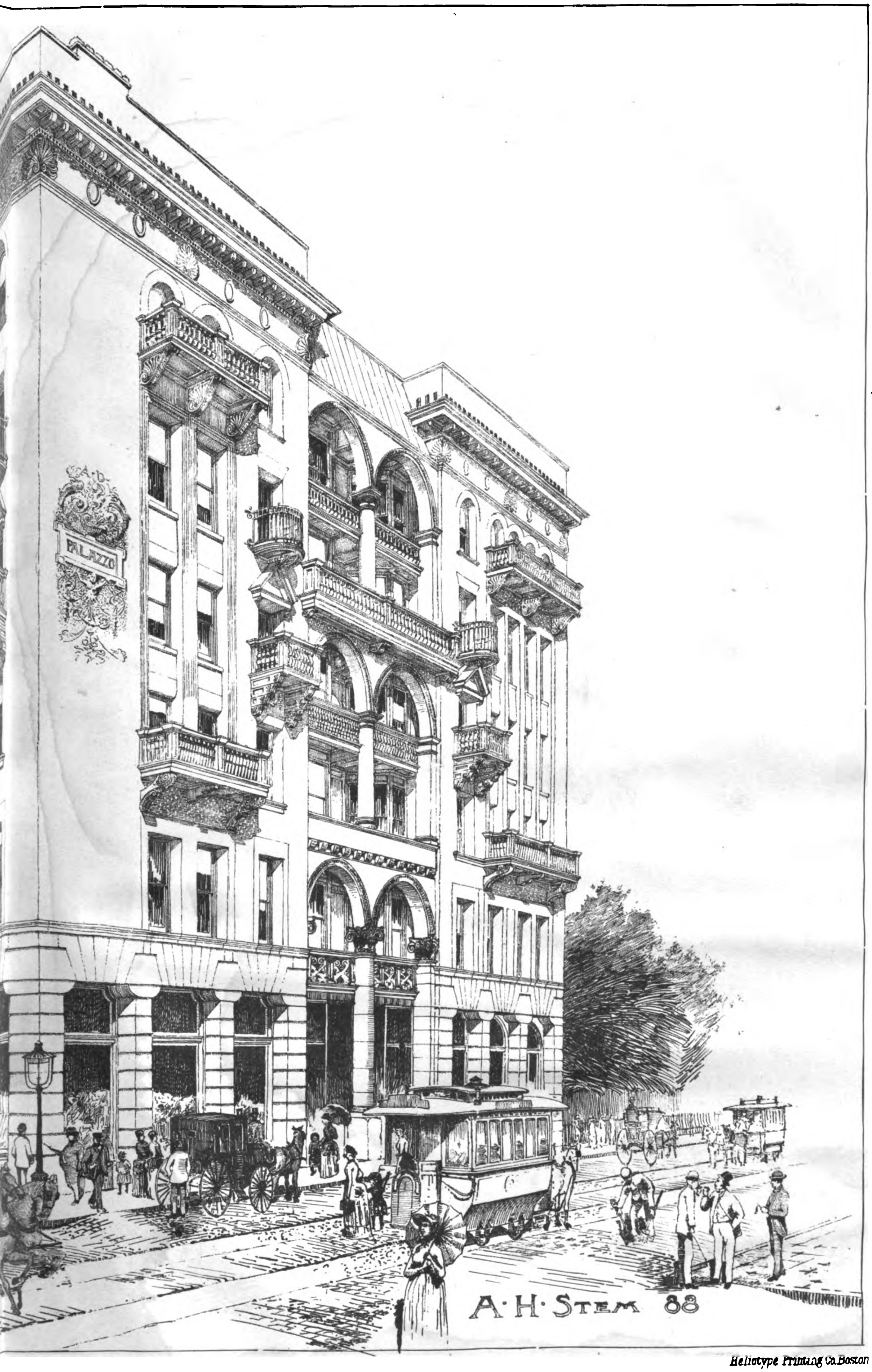

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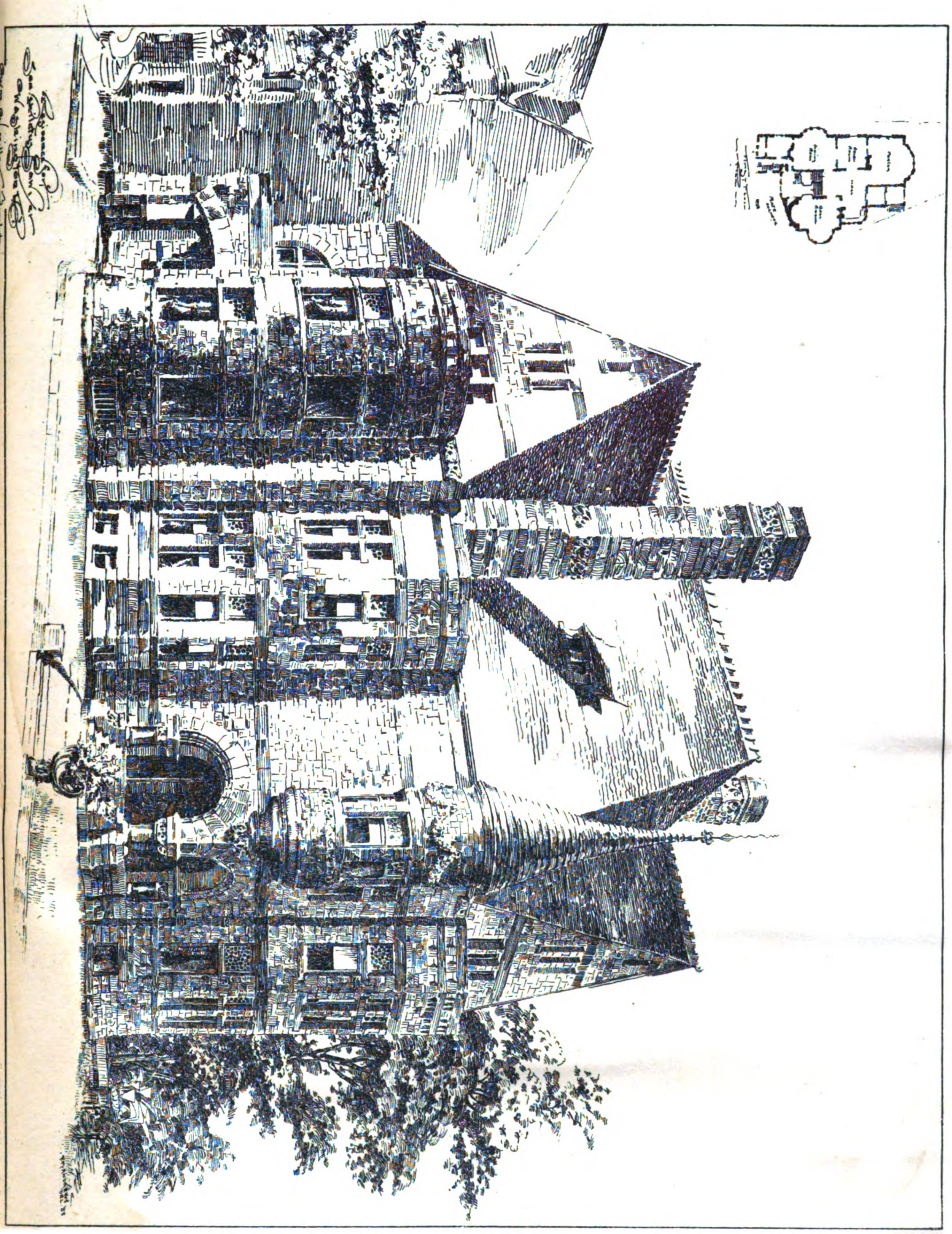

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The American Architect and Building News.

Vol. XXIV. Copyright, 1888, by Ticknor & Company, Boston, Mass. No. 675

DECEMBER 1, 1888.

Entered at the Post-Office at Boston as second-class matter.

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We print in another column a letter which, although not intended for publication, serves better than anything we could say to show how much strength the movement to place the architect in a better position than he now occupies in regard to supervision has already acquired in the profession. It is only by letting people, in some such way, understand how many others are ready to support them in any definite step which may be taken in the matter that a movement can be made with unanimity and success, and we hope that there will be enough architects willing to take the lead in each locality to carry it out firmly and judiciously. As we have already said, we believe that the public is willing and ready to provide and pay for clerks-of-works to attend to the minute details of supervision, so that architects may have time to do the higher work of planning and design to which they have been trained, and in which they can be of most service to their clients. To cite a single example, Mr. Keely, of Brooklyn, is said to have had more than fifty churches in progress at one time, and it is due to his industry and talent to say that all of them, if we may judge of those we have seen, were very far above mediocrity in design. Now, his buildings being scattered all over the country, it is probably quite safe to say that his visits of superintendence occupied, on an average, three days each. If he did nothing else but superintend, he could not see his churches oftener than once in six months all around, and, if he devoted half his time to designing, the visits of supervision would be annual. This would be practically no supervision at all, as it would amount to only one, or, at most, two inspections during the whole period of the execution of the work, yet there can be no doubt that his clients, if they were consulted, would wish him to give less, rather than more, time to supervision. They would say, with reason, that if he could not both plan and supervise, they preferred to have him keep to the former. They could easily hire some one to show laborers how to mix mortar, but only one man could design Keely's churches; and, as they wanted his design at its best, it was good policy for them to relieve his mind of the burden of a duty which he could not properly attend to, and thus gain time for him to devote to perfecting his special work. Although few architects have so many professional engagements as Mr. Keely, most of them are distracted in the same way between the necessity, enforced by a terrible responsibility, of sacrificing all other work to visits of supervision, and the desire of their artistic nature to study over their designs and work them up gradually toward perfection. At present, a few men, like Mr. Richardson and one or two others, have been bold enough to refuse to undertake responsible superintendence, and to claim the whole of their own time for the artistic development of their ideas; but the public certainly has not deserted them, nor would it, we think, be at all likely to desert other architects who might follow their example.

There is, moreover, another consideration which would lead the public to look with favor on the permanent abandonment by architects of the rôle of bricklayers' and plumbers' and tinmen's and carpenters' and painters' and mortar-mixers' "spotter," in the obvious injustice done by the present state of the law in regard to their responsibility. It is not many days since a lawyer, who had had a good deal of experience in building cases, told us emphatically that, if he were an architect, he should put all the money he earned into investments in his wife's name. The risk, he thought, that an architect ran of being reduced to poverty at any moment by the whim of a client who chose to visit on his head some real or pretended grievance that he had suffered from a builder was too great to make it safe for him to hold any property in his own name. We venture to say that many other lawyers would say the same thing, and the intelligent part of the public would agree with them; and, as the natural sense of fairness and justice which prevails in the community revolts at the idea that any class of men so useful and hard-working as architects should be debarred from accumulating property for themselves by the imminent risk which they ran of having it taken away from them and used to fill voids in other people's pockets which they did not make, an effort to set the profession right in this respect would be heartily seconded by all decent persons. As we have already said, the present system of expecting American architects to be their own clerks-of-works, and to be personally responsible for the testing of every barrel of cement, the mixing of every batch of mortar, the laying of every brick, and the quality of every timber in all the buildings they design, is ruinous to the architects, whose time it consumes with petty details with which they should have nothing to do, while it wears out their lives with anxiety; it is in the highest degree injurious to American art, since it forces the skilled architect, by a sense of the risks to which he is exposed, to spend nearly all his time in such supervision, and to leave the design of his buildings, to which no pecuniary penalty is attached, to his draughtsmen; and it is detrimental to the client, whose work would unquestionably be better done if it were under constant supervision, but who does not and cannot get such attention from the architect himself, while the frantic efforts of the latter to come as near such supervision as he can, diminish greatly the care and study which he is able to give to the plans. We have seen, since the present discussion began, an article in a daily paper, informing its readers that the architects had in contemplation a scheme for extorting money from the public by means of clerks-of-works, and calling upon all persons interested to combine to force the architects to furnish clerks-of-works on all their buildings at their own expense. It is hardly necessary to say that the editor of the paper in question is probably the only person who holds the views he expresses. In all other civilized countries, and to an increasing extent in this, clerks-of-works are appointed and paid by the owner, to guard certain of his interests which the architect is not asked or expected to take care of. If architects were to be required to pay clerks-of-works out of their present meagre fees, the profession would be vacant in a week, and would remain so until the public came back to the idea that architects could do something for it that it wished to have done, and would do so on being properly treated and properly paid, but not otherwise.

It would be singular if Boston, which is not at all an artistic town as compared with New York, should become more favored by artists than any other place in the country; yet it is by no means certain that this may not happen. It is unquestionable that the establishment of the Rotch Architectural Scholarship, by the generous children of the late Benjamin S, Rotch, has brought to or retained in Boston a considerable number of the most earnest and able students of architecture in the country, who have sought an opportunity of qualifying themselves, by the necessary two years' employment in a Massachusetts architect's office, to compete for this splendid prize. As a result of this, the Rotch Scholarship has been taken, in three years out of the four in which it has been awarded, by men from out of the State, who have spent little more than the minimum of time allowed in Massachusetts offices, while scores of others, who have the scholarship in view, are working industriously at their professional studies, to the advantage of the city and State, as well as of themselves. Within a short time a sim-

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ilar travelling scholarship has been established under the direction of the School of Drawing and Painting of the Boston Museum of Fine Arts. This scholarship is limited to residents of New England, under thirty years of age, who are students of painting, intending to devote their lives to the practice of this as a profession, and who are dependent on their own exertions for support. The successful candidate in an examination which includes drawing from the living model, sketching a composition, and painting a head from life, will be paid an allowance of six hundred dollars a year for three years, on condition of passing this period in diligent study in foreign schools of painting. To our mind, nothing has ever been done which will accomplish so much as this for art in America. Some one once said, in remarking upon the high degree of talent and learning among the Episcopal clergy in England, that although the great body of them were no better paid than the clergy of other denominations, the ranks of the ministry were kept full of men of ability and education by the small number of great prizes, in the shape of bishoprics, and other dignified and well-paid appointments, which were open to the best among them. Although not one in a hundred of the clergy would ever really become a bishop or a dean, the possibility was open to the humblest curate, and this possibility would cheer and encourage all the curates in the Church, as well as the young men who had a profession to choose. So the students of painting in New England, who find discouragements enough in that inhospitable clime to chill the courage of a Michael Angelo, will now have something to live and hope for, which will increase their ardor and determination tenfold. It is not the decorators of teapots, or the workers in pen-and-ink upon holly-wood fans, who will enter the lists for such a prize. They much prefer the adulation of their female friends to the fierce tumult of competition, and will leave the field clear to the people of real ability, who will know how hard they must work to win, and will gain in vigor of mind, in certainty of hand, and in habits of industry, by their efforts. In these alone every competitor will secure a great prize, but for the winner the scholarship offers as unalloyed happiness as the world has to bestow. To draw and paint is enjoyment, and to draw and paint well is a great pleasure, but to draw and paint so well as to have earned the right to go and live for three years among the best pictures, and learning from the best masters, without being hampered by the sordid cares and anxieties which distress so many students, is an object worthy to call out the best efforts of the ablest men, and we should certainly add, of the ablest women, for, judging from the exhibitions, there are few points in which the best women students are not already as skilful as any of the men.

A CURIOUS panorama is to be provided at the Paris Exhibition next year, by the Compagnie Générale Transatlantique, to represent its fleet of steamships. The panorama, or, as we have been taught to call it, cyclorama, is to be painted by M. Poilpot, who, we are told by *Le Génie Civil*, has already painted such views to illustrate the War of Secession in the United States, and, for all we know, may be identical with the eminent M. Philippoteaux, familiar to the American public as the artist of the "Battle of Gettysburg," the "Siege of Paris," and other cycloramic works which have made the tour of the United States. The Compagnie Transatlantique's cyclorama is to be mounted in a circular building by itself, and affords some novel effects. The spectator, on ascending the stairs, emerges upon what appears to be the deck of one of the newest and largest steamers of the fleet, the "*Touraine*," which is now in process of construction. Around him are the masts and rigging of the vessel, and he can hold by the shrouds and look over the bulwarks at the sea, which extends to the horizon. On one side can be discerned the red roofs of Havre, and lying at anchor at different distances are the other ships belonging to the Company, while the illusion is heightened by the mists which obscure the background. In order to surprise and dazzle the spectator, which is important to the effect of a panorama, an ingenious device is used to detain him in the dark passageways leading to the fictitious ship's deck, in the shape of dioramas, or illuminated pictures, to be looked at through a lens fixed in the side of a box. Seven of these are provided, representing the ship-building yard of the Company at St. Nazaire, the embarkation of emigrants, and various scenes on board one of the great vessels during a voyage. All of them are interesting, and the visitor moves slowly through the darkened passageway, looking successively into the lenses, until his eyes have become accustomed to the feeble light, and the pupil has expanded so much as to be quite overwhelmed with the brilliancy of the great cyclorama, on emerging upon the platform.

THE description of this cyclorama serves as the text for an interesting history of panoramas in general. Their first invention is due to a Scotch painter, Robert Barker, who, while in prison for debt, attempted to read a letter by the light that came through the tiny loop-hole of his cell, and was struck by the singular effect of the illumination upon the paper. He studied the phenomenon carefully, and on his release from jail, in 1796, he undertook to utilize his observations by exhibiting a picture under artificial illumination. Three years later he brought out a panoramic picture of London, which had great success, and was followed by similar views of Portsmouth Harber, and other scenes. Robert Fulton was in England at the time, and, immediately on the production of the London picture, conceiving that the idea would be successful on the Continent, took out a patent for it in France. He had several panoramas painted in Paris, by Prévost and Constant Bourgeois, representing the cities of Amsterdam, Rome, Naples, and so on, the Camp of Boulogne and the Battle of Wagram. In 1810, Napoleon, with characteristic quickness in converting to his own benefit any new idea that might be of service to him, observing the interest taken by the public in Fulton's battle-scenes, ordered the architect Cellerier to prepare a scheme for seven panoramas, representing his own victories, which he proposed to have carried about and exhibited all over France. Unfortunately, just as the plan was matured, Napoleon himself was captured and carried off to Elba, so that the demand for panoramas of his victories declined, and Prévost, who would probably have been the painter of them, was obliged to content himself with exhibiting, as a private enterprise, some views of Athens, Jerusalem and Antwerp. Since then, panoramas have always been popular in Paris, and such renowned artists as Détaille and Alphonse de Neuville, among others, have taken pleasure in painting them for the public. The best of the French ones usually either come to this country or are sent to Russia, after the Parisians get tired of them, and the English and Germans have some of their own, which they find pleasing.

IN answer to a question of a correspondent, M. Collet-Corbinière writes in *La Semaine des Constructeurs* an interesting essay on the law of France in regard to payment for extras on contracts. The correspondent in question, a builder, contracted to erect a house according to certain plans and specifications, which showed and described a fence sixty feet long, and a corner tower, two stories high. As the work went on, the owner wished to have the tower made higher, and the accommodating builder carried it up two stories more. He wished also to have the fence extended to one hundred and fifty feet, and three gates put in it, all of which was done. The builder then asked, on his side, to be paid for all this extra work, and was told that no written orders had been given for it, and, under the law, the owner was not bound to pay for it. M. Collet-Corbinière naturally sympathizes with the contractor, but replies that the law is plain. Under the Code Civil a man who contracts to build according to a definite plan, and for a fixed price, cannot demand any increased price, under any pretext, on account of changes or additions, unless such changes or additions are ordered in writing, and the price for them agreed upon beforehand with the owner. The only occasions on which the courts have varied from this rule have been those where the contract was not a perfectly definite one, so that it did not answer to the description in the Code, and these exceptions are rare. He therefore advises the sufferer not to try to evade the law, but to set himself to examining his plans and papers, to see whether he cannot find some letter, or marginal note on a drawing, which will answer as a written order under the law, or will, at least, so far imply an order that the written memorandum may be explained by oral testimony in court, and, so explained, be enforced as if it were written out in full. M. Collet-Corbinière does not say whether drawings or sketches are in France considered to be written orders within the meaning of the law, but we infer from certain points in his letter that they are not. In this country they would be so considered, and if the builder could find sketches made by the owner, and showing the modifications as carried out, he would be pretty sure of getting his pay, whatever the contract might say about requiring orders for extra work to be in writing.

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ARCHITECTURAL EDUCATION IN THE UNITED STATES.[1] — IV.

COLUMBIA COLLEGE, NEW YORK.

A Roman Fountain.

IN the year 1881, Prof. William R. Ware, at that time in charge of the Department of Architecture at the Massachusetts Institute of Technology, was invited to undertake the formation of a similar department in connection with the School of Mines, Columbia College. Previous to this there had been no regularly organized school of architecture in New York City, though the necessity therefor had long been felt, and the Trustees of Columbia College were quite ready to do anything in their power to place the department on a proper footing, and to equip it in such a manner as to enable Professor Ware to carry out his ideas and to give the proper stability to the institution. Mr. Augustus Schermerhorn, one of the Trustees, provided the means for the greater portion of the equipment, something like ten thousand dollars being expended under Professor Ware's immediate direction. The portion of the College buildings in which the department is now installed was erected subsequently to Professor Ware's appointment, and was, consequently, arranged in deference to his wishes, so as to give the best results for drawing-rooms, library, etc., and was intended to be as nearly perfect as possible.

The department has two assistant-professors, who have charge of certain lectures, etc., one draughtsman, and one librarian.

The attendance is obligatory in all cases. For convenience, the course has been divided so that the students are grouped in three classes, the third and fourth year men studying together. There are no special students or special courses, as such; but any one entering the College on advanced standing may be allowed to pass examinations upon the studies of the first year, and, during the remainder of the year, can follow any studies he chooses, as extras. He may thus, though not recognized as a special student, pursue special studies.

The regular course of study during the first year is practically the same for all the departments of the School of Mines, and involves simple mathematics, physics, and a certain amount of elementary drawing; but the latter is entirely separate from that of the other courses, and includes shades and shadows, drawing from the cast, and brush-work. The studies for the succeeding years are as follows:

COURSE IN ARCHITECTURE.

SECOND YEAR.

Graphical Geometry.
Graphics — descriptive geometry.
Elements of Architecture: forms and proportions of the five orders and of balustrades, doors, arches, etc.
Ancient Architectural History.
Applied Chemistry: air, water, artificial illumination, photography, cements, timber and its preservation, pigments, glass, etc.
Drawing: tracing ornament, plans, sections and elevations, details, perspective.

THIRD YEAR.

Mechanics.
Sanitary Engineering.
[2] Mediæval Architectural History.
[3] History of Ornament, lectures and exercises.
Theory of Architecture.
[2] Specifications and Working-drawings.
Architectural Design.
Geology.
Drawing: from the cast, ornament and figure.

FOURTH YEAR.

Civil Engineering: theory of strains and strength of materials continued.
Graphical Statics.
Sanitary Engineering.
Sewerage.
[3] Business relations between architects, clients, mechanics, and draughtsmen; office papers; competitions; legal obligations; superintendence.
[3] Estimates.
[3] Modern Architectural History.
[3] The History of Painting and Sculpture.
[2] The Decorative Arts; lectures and sketching; excursions.
[3] The Theory of Architecture — the theory of color, the theory of composition.
Literature and Criticism: themes, reports; abstracts of books.
Economic Geology: clay, limestones, cements, building and ornamental stones.
Architectural Design: problems.
Project.

In regard to what might be termed the practice of construction, as distinguished from the study of theoretical construction, the ground is taken that it is not the business of the school to teach what can be better learned in architects' offices. Still, an hour a week is given to a course of lectures upon specifications, estimates, etc., as shown in the programme, and there is in the department a carefully prepared series of drawings illustrating all the ordinary constructions, which the students copy and trace at their leisure, by way of preparation for office-work, though no examinations in this work are exacted. The lecture on specifications is followed by an afternoon's work in figuring, estimating, etc. The study of scientific construction is pursued mostly in connection with the engineering departments of the School of Mines. It is intended, subsequently, to bring these into the architectural department as far as possible.

[1] Continued from No. 667, page 157.

[2] For convenience these subjects are given in alternate years, the third and fourth year students taking them together. In 1887–88 both classes take the work here set down for the fourth year; in 1886–87, that set down for the third year.

[3] For convenience these subjects are given in alternate years, the third and fourth year students taking them together.

To aid in the study of specifications, a model has been prepared after consulting a great number of specifications which have been used on actual work. This model is copied by each student into a book, the copying being put on one side of a sheet only, and subsequently filled in with notes, queries, etc., which suggest themselves to the student at the time, or may come up later as a result of intercourse with practical work. In addition to this, there are, every year, lectures on quantities and estimates, given by some regular practitioner; and a part of one year is given to the study of Professor Clark's work on "*Building Superintendence*," which is read and commented upon by the class.

In the first year, as previously stated, the only architectural work is in the line of elementary free-hand and mechanical drawing. In order to start the students in right lines, a number of methods are followed. The first exercises consist in copying drawings in plain washes. Then, in order to relieve the monotony of plain copying, and to encourage the students to think for themselves and to use the different mediums, they are required to make, as it were, translation drawings; that is, an engraving or photograph is given to be copied in India ink or reproduced in crayon, so that the students' appreciation of the values of different mediums will be developed. There is, also, a certain experience given in water-coloring from black and white drawings, and the student is instructed in the use of drawing instruments and in simple pen-work. All of this is during the first year, and is in addition to a limited amount of cast-drawing, shades and shadows, and perspective.

The architectural drawing in the second year is carried on as an adjunct to the theoretical instruction. The orders are studied very thoroughly in connection with lectures on the elements of architecture, so that the student has careful drilling in proportions, forms, etc. The subjects illustrated in the lectures are subsequently drawn out on the black-board by the pupils, criticised in the class, so that each gets the advantage of the work of the whole, and finally are drawn out in pencil, but not inked in. This is varied by exercises calling for the application of principles previously discussed in lectures, such as the drawing out of a portico, an arcade, or a vault. At the same time, there are lectures and illustrations on practical problems in shades, shadows, and perspective.

The third and fourth year students are united in a single class. The drawing consists of illustrations of the "History of Architecture," drawn after the lectures in the same manner as during the second year, together with a stated number of problems in design, carried forward in much the same manner as is followed in the School of Fine Arts, Paris, the problems being stated to the class, sketches submitted and *rendus* studied out in regular order, the work of each student being discussed and criticised in such manner that the whole class gets the benefit of the training of each individual. Besides this, there is a considerable amount of drawing from the cast. The department is supplied with a number of small casts, which are given out to the students once or twice each week to take home to draw from by gas-light. This exercise is found to be of great value.

The first of the purely theoretical studies taken up in the course is the "Theory of Architecture." This is intended to be more negative than positive in its nature, and is designed to help the student to discriminate and to use his judgment. One hour each week is given to the study. In the first term the line of beauty is discussed, the theory of proportion, symbolism, and the use of natural forms in their relation to architectural design. The lectures are fully illustrated, the aim being always to awaken thought in the mind of the pupil. In alternate years lectures are given on "Color," with illustrations from the Department of Physics. In the second term the allied arts are brought up in their relations to architecture, illustrated and discussed in the same manner as the general principles previously considered.

The lectures on "Ornament" are prepared in a manner which commends itself at once as being calculated to draw out individual thought on the part of the pupil. A syllabus covering the general points of the lectures is prepared and printed. Each week, one student is assigned the lecture, and is expected to consult his classmates' notes, as well as his own, to examine such authorities on the subject as he may desire, and write a full report of the lecture. The written sheets are hektographed and distributed to the members of the class.

In the study of the "History of Architecture," ancient work, including the early Christian epoch, is taken up during the second year, Mr. Clarke's translation of Von Weber's "*History*" being used as a text-book. One hour's lecture and one hour's recitation is given to this each week. To fasten the dates and the facts in the minds of the students, Professor Ware has prepared a set of architectural tables, which are given to the students to be committed to memory. In the third class, extending through the third and fourth years, Gothic and modern history are taken up alternately. In this department Professor Ware met with a difficulty which every teacher has doubtless encountered. The students, while faithfully following the mere lessons, would utterly fail to grasp the sequence and significance of what had been put before them; so that while the final examination papers showed a considerable degree of book-learning, the students had little real knowledge of the history of architecture. A better way was accordingly devised, and is now followed. In the first term the whole subject of either Gothic or modern architecture is skimmed very hastily by topics, without dwelling on special points,

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but simply outlining the study. The subject-matter is then divided into half as many topics as there are students in the class; and, as the end of the term approaches, two students are assigned to each topic, to study it up, examine it and write essays upon it. The next term, these topics are taken up in succession week by week, the essays read by way of introduction, and the whole class gives its time to further elucidation and illustration. To this end, the books and photographs in the library bearing on the general subject are divided into groups, to each of which two students are assigned, to exhaust it and report what they may find at the end of the week. The next week two more essays are read, introducing another topic; the students move on to a fresh group, and another series of reports are prepared. In this way, each student is obliged to know thoroughly at least one important topic of the period of history the class is studying; and, as the groups of books are moved along from week to week and assigned to different pupils, it follows that at the end of the term each student has looked through the entire contents of the library relating to the period under investigation, and is reasonably familiar with what can be found there.

A very interesting feature of the department is the attempt which has been made to encourage work on the part of the students during the long summer vacation. According to the regulations of the School of Mines, each student is obliged, at the beginning of the fall term, to present a thesis upon a certain amount of work done during the vacation. In the department of Architecture, instead of a thesis, each student is required to present on the first of October, one hundred sketches made during the vacation. No restrictions are made as to the kind or nature of work — simply that there shall be one hundred sketches of some sort. The results have shown that the students are not inclined to slight the work, but, on the contrary, exert themselves to see who can present the best, and some of the summer work thus prepared has been of considerable artistic value. The only limitations are that the student shall include the plans, sections and details of some one house. If the student, instead of sketching, prefers to spend his time in an architect's office, he is encouraged to do so, and each day in an office is counted as equivalent to one sketch. The results thus far in regard to vacation work have been entirely satisfactory.

There are a few special features in connection with the department which are worthy of note. Columbia College requires a certain knowledge of French in order to pass the entrance examinations, but students seldom are able to properly use the French books in the library. To aid them to a better acquaintance with the language a scheme has been devised which has been found to work admirably. Two hours a week have been given to it during the first year. Maspero's "*L'Archaeologie Egyptienne*" was selected for reading. A page is assigned to each member of the class, and at the recitation, is first read aloud by the pupil, then translated and then re-read. Each student is required to have his copy of the book with him and to make marginal notes; and it therefore follows that very few expressions will fail to be appreciated. In fact, it has been found that in this way the student acquires a familiarity with the language in a very short time, as each is enabled to profit by the other's mistakes and is also obliged to thoroughly study a definite portion of the work each week.

An exercise which has been found of great value, is somewhat as follows. Photographs of buildings are given to the members of the class, each of whom is required to write out a careful description stating the character of the building before him, the kind of windows, the mouldings, etc. Then the students exchange descriptions, and, without knowing the original, make a drawing from the description. Finally, the drawings and descriptions are compared by the class, and criticised.

Besides the lectures on hygiene and kindred topics which are given to the entire third college class, a special course in Sanitary Engineering is given to the students of architecture. This covers, in the third year, the drainage of buildings, the arrangement of pipes and fixtures, the disposal of household refuse, and the drainage of cellars and grounds. During the fourth year, the ventilation and warming of buildings is taken up, and discussed from both the practical and the scientific points of view.

In view of the circumstances under which the department was founded, it will readily be understood that the equipment is all that can be desired. Professor Ware has not been stinted in money nor in encouragement, and he had everything he could need to make the work a success. The drawing-rooms are large, well lighted, and arranged to give the students the best facilities for consulting the library, working in the modelling-room or attending recitations. Modelling, however, is purely an extra at present, though the opportunities are open to those who wish to avail themselves thereof. The main library of Columbia College contains 80,000 volumes, besides American and foreign periodicals, etc., forming a very rich collection for general reference. In addition to this the department of architecture has a special library of about 300 volumes, carefully selected by Professor Ware, intended to be exhaustive in its nature and to include all of the best professional works. These are kept in a room adjoining the drawing department and are at the disposal of the students at all times. Books may be taken away from the building under special conditions and everything is done to encourage the students to use the volumes constantly and to draw from them as freely as possible. There is also a collection of water-color drawings and colored prints, used for copies, and about eleven thousand photographs, which are mounted on loose sheets and kept in portfolios. The students are allowed to use these photographs as they please, to take them from the shelves, and to have them beside their work, but are not allowed to put any of them back on the shelves. One of the attendants goes around the room at stated intervals and collects all the photographs not in actual use, restoring them to their proper places, so that they do not become misplaced, but can readily be found when wanted. The department has also a limited number of models, mostly of the orders.

The requirements for admission to the department include a knowledge of arithmetic, geometry, algebra, rudimentary physics and chemistry, French, German, book-keeping, and free-hand drawing sufficient to sketch ordinary objects. The number of students at present is fifty-four, and there have been about sixteen graduates, three of whom are practising architects in New York City and all the rest are in New York State. The graduates' degree is that of Bachelor of Philosophy.

The expenses for attendance at the school are as follows:

Matriculation fee	\$5.00
Annual Tuition	200 00
Text books, first year	15.00
" second year	30.00
" third year	50.00
" fourth year	20.00
Materials, \$15 to	25.00
Graduation fee, with diploma	30.00
Total	\$375.00

Add to this, board outside of the college at from \$6.50 to \$10.00 per week and the total expense for the course is from \$560.00 to \$700.00.

Free tuition is offered upon the following conditions:

1. The applicant must present a certificate from some person of good repute, stating that he is of good moral character and studious habits; also that he is unable to pay the tuition fee.

2. He must exhibit a proficiency in every subject of examination for admission of six on a scale of ten.

3. He must maintain an average standing of seven in every subsequent study, or an average of eight in all the studies for the year.

4. He is not exempted from fees for matriculation, for extra examination, and for graduation.

LIBRARY BUILDINGS.

I READILY accede to your request for a further treatment of this subject, in the interest of a better understanding between architects and librarians.

In answer to the statement that librarians disagree among themselves on this subject, so that no consensus of the views of the profession is available, I asserted that certain well-defined principles have been laid down by a practically unanimous agreement of librarians, which principles are constantly violated by architects and building-committees through their failure to learn of these facts, or to appreciate their bearings.

In the Library Conference held in Boston in 1879, Mr. Henry Van Brunt said: "Doubtless we made a false start by endeavoring to adapt our large public collections to the traditional and architectural library halls, surrounded by chapel-like alcoves, in several stories." And again: "The purposes for which our own public libraries are established are new to the world of literature and books, and naturally affect the question under consideration."

In just this line the Library Association voted two years later, 1881, at Baltimore (and without a dissenting voice):

"*Resolved*, That, in the opinion of the Association, the time has come for a radical modification of the prevailing typical style of library building, and the adoption of a style . . . better suited to economy and practical utility."

Unless both my memory and my examination of the *Transactions* of the Library Association are at fault, no one member has since, by voice or vote, favored in our conferences the "traditional and architectural library hall" style of building, and it should by this time be well understood that that style is not in favor with those most conversant with modern library wants. Perhaps the reply will be that it is easy to condemn that form of building, but more difficult to find a satisfactory substitute. But substitutes have been found, and while there is a difference among librarians as to which is best, they have features in common that represent the settled views of the mass of librarians. Mr. Van Brunt's criticism of the ancient style of building, quoted above, was made in connection with an account he was giving of the then new "stack" at Harvard, an arrangement which he had planned for obviating the objectionable features of the old style. In the stack, we have rows of iron bookcases placed as

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near together as is consistent with convenience of passing between them, and running from floor to ceiling of a room some fifty feet high; light open iron-work floors being introduced at intervals of seven and one-half feet, so that every shelf may be easily reached from them, avoiding altogether the use of step-ladders. The walls, not being used for shelving, are pierced with numerous large windows, pouring a flood of lateral light into the stack, which is also lighted from the roof. Space for readers' small tables is provided on each floor, distributed so that facilities for the use of the books may be found very near every shelf in the library. As compared with the old conventional library building, the stack has the advantages of greatly increased book-room per cubic foot of space within the walls, increased facilities and improved conditions for the use of the books, and a much greater supply of light.

But the stack-system is only one way of gaining these advantages. Another method is prominently before the library profession, largely through the able advocacy of Dr. W. F. Poole, of the Newberry Library of Chicago, a method which has not quite all the advantages claimed for the stack, but which claims others that are wanting in it. It is what may be called the single-floor system, allowing only one range in height (say seven feet) of shelving to be placed in one room, an equal or greater space being left above for the proper diffusion of air and light.

In the great majority of cases, library buildings are erected where land is not expensive and a large floor-area is available. Where this is the case, a library of very considerable size may be shelved so as to obviate entirely the need of steps and stairs; and, where land is more expensive, one such floor may be placed above another indefinitely at intervals of fifteen feet, elevators putting them practically on one level. It is claimed for this single-floor system that the superior supply of light afforded through its admission by high windows above the top of the book-cases, with nothing to intercept its fall between and around them, and the fact that no books are placed near the top of a room to their own injury by heat and gases, and to the serious discomfort of the users, more than atone for the failure to utilize, as does the stack, every foot of perpendicular space for book-storage.

However this may be, the discussion among librarians now is between these two systems in their main features, and all agree in requiring that a library building shall have, in one or the other form, the advantages common in some degree to both; viz., great capacity, abundant light, convenience of use.

It is when we turn from our little differences of opinion as to which ways are best for securing these ends, to such buildings as the Winn Library at Woburn, Mass., and the Howard Library at New Orleans, that we leave our mutual bickerings and join in deriding the poor architect. In these two beautiful buildings we find the old "traditional" style in its glory, with its alcoves, its high step-ladders, its galleries (and even step-ladders in the galleries), its narrow windows, one in each alcove, shedding a dim religious light into the interior, its large tables running down through the nave. In the Howard Library (unless recent changes have been made) the windows are eighteen inches wide, and pierce a three-foot wall (two feet of stone and one of bookcases), and a person to go from the alcove behind the desk to the gallery immediately above it must travel the whole length of the room twice, besides ascending the stairs, and perhaps a step-ladder, too. Well might he say to the book just over his head, "Thou art so near, and yet so far!" In this same building, I believe, the only way a place could be found for the librarian and assistants to work was to fence off one alcove.

Provision for efficient and economical administration is one point with regard to which it is plain that no architect could go right without definite instruction as to the method of administration to be employed in the building. Such instruction architects are quite apt to be without, for the reason that no one is on the ground who is competent to give it. Almost every public library has these departments more or less fully developed: reference-department, circulating-department, and reading-room. The erection of a new building should facilitate the due development of these three departments, in strict relation to each other and to the special wants of the particular community, and with a due regard to the means likely to be at hand for supporting the administration. If one person be expected to supervise more than one department, these departments should be so arranged as to make that feasible. I hope I shall be pardoned if I attempt to illustrate this point by commending the arrangement of the Amherst College library, especially as it was all done before I ever saw Amherst.

Our present library building is a re-arrangement of an older one, with the addition of a new wing for the book-stack. The library and reading-room are on the second floor, the lower floor being used for secondary purposes. At the top of the staircase one enters the delivery-room, facing the counter of the attendant, who has been able to observe him almost from his entrance upon the stairs. At his right he finds the large reading-room, nearly the whole of which (the wide doors always standing open) is under the eye of the same attendant. At his left are the card-catalogue cases and a shelf of indexes, etc., with a little space for their convenient use, furnished with tables and chairs. Through the counter is a gateway, admitting, under the surveillance of the same attendant, to the entrance of the stack, which (being on the second floor of the main building) he enters midway of its height, and finds himself as centrally located as he could be in the library itself. Never, I believe, was a library better arranged to enlarge the scope and usefulness of a single attendant. Except as pressure of work calls for assistance, he easily attends to all the three departments of reference, circulation, and reading-room. My moral is that this could not have been provided for without intelligent understanding of the administrative functions of the library, and it should be stated that the architect was a graduate of the college, who had freely used, and taken a deep interest in, the library.

But when the different departments of a library have been arranged with reference to an efficient and economical service, there is yet to be made provision for the work which must be done "behind the scenes." Books will be received in cases and parcels. They must be delivered at a rear or side entrance, opened in a suitable room, where some dust and dirt will not be seriously objectionable, spread out on tables in an adjoining room for examination, cataloguing and labelling, and then sent to their places in the library. No problem is more difficult, perhaps, in the arrangement of a library building than that of placing the librarian's own office or desk, which on some accounts needs to be in close contiguity to the public part of the building, accessible to those needing his guidance in their reading, and on other accounts should be near the place of receipt of new books. Hardly any two libraries or two librarians would agree in their requirements in this line; but, if it is once clearly seen by architects that no library building can be a success in which some provision, in accordance with the circumstances of the particular case, is not made for these various needs, they will soon fit themselves to deal with the problems involved, and will doubtless handle them successfully.

WM. I. FLETCHER.

WATERHOUSE ON RICHARDSON.[1]

Capital from St. Leger, Soissons, France.

THE other biography I would allude to is that of a very different but also very remarkable man, Henry Hobson Richardson, of Boston, U. S. A., an Honorary Corresponding Member. Street was the king of draughtsmen, and drew every detail of his innumerable buildings himself. Richardson, on the other hand, was supposed never to have designed one of his later and more perfect buildings with his own hands; yet no architect ever put his name to structures which were more unmistakably his own creation. Street made the pointed arch the key-note of all his construction; Richardson saw the capabilities of the round arch, and his work in great measure was based upon Romanesque, though he treated it in his own original fashion. His works are so remarkable that I feel sure you will allow me to say a little more on a subject which has for me a singular fascination.

Richardson was a student of the École des Beaux Arts. He remained in Paris six years, working as a student and draughtsman, for he had to earn a living as well as to study, and lived practically two lives in one. In those days his great ambition was to go to Athens and Rome. He never, in fact, went to either, and, in spite of his training, never was architect less influenced by what these two centres of past art would have had to teach him. On his return to America in 1866, his first designs were in thirteenth-century Gothic, and in no way remarkable. But in 1870 he gained in competition the execution of Brattle Square Church in Boston, a building remarkable for its campanile with deep sculptured frieze, a tower so original as to be like nothing he could have seen or heard of elsewhere, though it has about it a certain Romanesque air. The neighboring Trinity Church followed soon after, with a central tower of excellent proportions, both in itself and as part of the composition of which it was, of course, the crowning feature. In construction it is no less bold than its detail is beautiful. Its weight of 8,500 tons is supported by four granite piers with a collective area of 100 square feet. His public libraries, of which he built several, have a family likeness in their plan and style, though each proclaims its distinctive character. His Pittsburgh Court-House, Field's Chicago Building and Cincinnati Chamber of Commerce are buildings of a monumental character, and give evidence of an original creative mind, free from prejudice and unfettered by precedent. Richardson's peculiarities may be seen in all. These peculiarities appear to be chiefly the discarding of the orders, the Romanesque feeling, admirable planning, appearance of strength and solidity, the value put upon mere wall-surface whenever attainable, the treatment of this surface by the varied coursing of the stonework, and the contrast between tooled and rough surfaces; the use of colored materials, especially of stone of different hues; battered bases, sparing use of string-courses, the introduction of deep voussoirs, the rounding of salient angles, and a leaning to circular forms on plan. In his later work his corbels are rounded and covered with delicate incised carving instead of mouldings, and his capitals are convex rather than concave. All these peculiarities appear to be based on sound judgment, and to be excellent in every way. On the other hand, if criticism were in such a case allowable, there seems, to my eye, almost an affectation in the shortness of

[1] From the opening address of the President of the Royal Institute of British Architects, Mr. Alfred Waterhouse.

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some of his columns, and want of height in many of his circular archways. There is something ungainly in the upper part of transomed windows being made wider than they are high. It is also to be regretted that in many of his buildings the ridge and hip tiles and gable finials appear to be so heavy as to dwarf the general effect. In 1882 Richardson visited for the first time Southern France, Northern Italy and Northern Spain, and only then saw the best specimens of architecture from which he drew his inspiration. The effect of this tour, though he allowed himself no time for sketching, is visible in the works he executed in the short time afterwards left him. His becoming so devoted to, and so skilful an originator in, a style the best examples of which he had not seen, is in itself extraordinary, unless, indeed, a Romanesque wave had affected the American architectural mind before his advent. He seems to have created a new-born interest in architecture in America, perhaps by doing exactly what he thought best suited to the expression of his buildings, without going out of his way to look for precedents. In consequence, his work is never commonplace. He has left behind him a school of young Americans who appear to be following his steps in developing the capabilities of Romanesque art — an art which, we must bear in mind, did not die of inherent weakness, but was extinguished before its time in the twelfth century by the difficulties of vaulting oblong spaces and the consequent introduction of the pointed arch. I have, perhaps, said enough to show that Richardson's "*Life*," by Mrs. Van Rensselear, illustrated by photographs of his works, is worthy of earnest study.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

HOUSE OF J. P. KERNOCHAN, ESQ., NEWPORT, R. I. MR. J. D. JOHNSTON, ARCHITECT, NEWPORT, R. I.

[Gelatine print, issued only with the Imperial Edition.]

CENTRAL SCHOOL-HOUSE, ERIE, PA. MESSRS. D. K. DEAN & SON, ARCHITECTS, ERIE, PA.

THIS building is 270′ long and 136′ wide in extreme dimensions, contains 24 school-rooms of an average size of 24′ x 38′, two rooms of 25′ x 100′, four rooms 24′ x 24′, all of which are supplied with cloak-closets provided with outside light. The central part of third story contains a hall 80′ x 90′, with stage, scenery, and four dressing-rooms, each 12′ x 20′. The building is heated by the Rutan-Smead system, and the system of Smead dry-closets is used. The basement is entirely given up to the heating and ventilating apparatus and the dry-closet system. All the interior finish is quartered oak. The cost of the building, exclusive of all furniture or school apparatus, is $145,000.

HOUSE FOR A. B. GOODBAR, ESQ., MEMPHIS, TENN. MR. W. ALBERT SWASEY, ARCHITECT, ST. LOUIS, MO.

THE house is built of Stock brick with Kibbe brownstone trimmings, red slate roof, first story of hard woods, balance cyprus; has ten rooms with dance-hall in attic, cost $16,000.

SKETCH FOR A CITY HOUSE. MR. FRANK MILES DAY, ARCHITECT, PHILADELPHIA, PA.

STORE AND OFFICE-BUILDING ON SCHOOL ST., BOSTON, MASS. MR. W. M. BACON, ARCHITECT, BOSTON, MASS.

DESIGN FOR A TOWER. MR. J. R. RHIND, ARCHITECT, MONTREAL, CANADA.

PULPIT ALTERATIONS DESIGNED BY MESSRS. W. W. BOSWORTH AND A. H. EVERETT, BOSTON, MASS.

THE PRESENT ASPECT OF LAND-DRAINAGE.—I.

The Trinity.

TWENTY-FIVE years ago, land-drainage hardly had a recognized position in this country, except in connection with that much derided art called "Fancy Farming." Most of the farm-drainage was done with stones or with horse-shoe tiles, which can hardly be called tile-draining. There is no better evidence of the value and extent of the influence of agricultural books and papers, of Book Farming, than the degree to which they have made known and acceptable to the farming community the results of isolated examples of work done mainly at the East. At the time spoken of, draining-tiles were made in few places and at rather high prices. The cost of their transportation prevented their extensive use in the interior. It was at that time asserted that the great garden spot of the West, Illinois, was so blessed by nature that it had no need for underdraining, and the same opinion was held as to much of the rest of that section of the country. The case is now gravely changed.

There are in single counties, in Illinois, more works for the manufacture of draining-tiles than there were drained farms in the State twenty years ago. The total length of underdrains in that State is now over 700,000 miles.

Illinois is not exceptional. In the best agricultural regions of the whole country, especially east of the Mississippi River, the underdrainage of lands not naturally sufficiently dry for the best production is general. The methods adopted are, of course, in many cases, rather crude, but the general result has been to secure a marked increase of product, immunity from the effect of excessive wet and drought, and a great mitigation of the malarial conditions formerly prevalent. In these respects, we have but repeated the experience of England. Agricultural underdrainage is hardly to be regarded now as an element of professional engineering work.

Those who carry on the trade of tile-draining understand sufficiently well for practical purposes a tolerably good method for securing the end in view. The same may be said with regard to surface-drainage, which is much more effective than, in the days of my first advocacy of underdrainage, I was disposed to admit. The reasons why any drainage of agricultural lands is required are better understood now than they were then. Probably the great advantage derived from the prevention of a condition of saturation is that it favors the continued and effective action of those minute organisms in the soil on which fertility so largely depends. It was formerly supposed that the organic constituents of the soil and the applied manure, as well as the mineral constituents were brought into a condition fit for the use of plants by the mere chemical effect (oxidation) of air circulating among them. It has been demonstrated within the past ten years that the conversion of organic remains and organic manures into a condition available for the feeding of plants is the work of bacterial action. This work results in oxidation it is true, but the process is very different from that resulting from immediate chemical contact. That the development of the fertilizing qualities of the mineral constinuents of the soil is also due to a corresponding action of living organisms has not been demonstrated, but the growth of rhizopods on the surface of minerals, and the consequent change of character of the inorganic structure itself and the cryptogamous vegetation peculiar to certain mineral solutions would indicate that such action is possible.

SURFACE-DRAINAGE.

While the effect of aeration in the subsoil increases porosity, and the withdrawal of the water-of-saturation from the lower strata of the soil is as important as it was originally supposed to be, there is no doubt that the most valuable effect is produced in those parts of the soil which are near the surface and are by underdrainage kept always in such condition that their living organisms do not have their activity suspended for long periods by a saturation that excludes atmospheric air. In many cases, this more important effect of draining the upper portions of the soil may be secured, in measurably useful degree, by surface-drainage, that is, by affording the surplus water an opportunity to flow freely away over the surface instead of lying to be slowly absorbed by the soil. As compared with its cost, much of the most useful effect will be produced by the use of catch drains to divert the flow of surface and spring water from higher lands and by such a regulation of the surface as will prevent water from standing in pockets or lying on level tracts after a storm has ceased.

The removal of water from the surface of level lands which are not underdrained is most economically effected by the opening of ditches for its removal. If the ditches are reasonably near together, a good result will be produced by giving them a water-level of from twelve to eighteen inches below the surface. They should be so arranged as to receive the water of the surface freely: to hold the water of a heavy storm at a level slightly below the surface of the ground, and to run down to the indicated level within twenty-four hours. Rolling lands, with swales and pockets in which water stands and accumulates, may be relieved often much more simply and economically by the running of single lines of depressed water-ways. These need not even be ditches, only continuous artifical depressions with broad banks, susceptible of cultivation and of machine-mowing and leading to a proper point of discharge. To provide such a means of drainage is easy and inexpensive if a proper point of outlet is at hand.

In many cases, and it is these that call for the intervention of the engineer, tracts sometimes of many thousands of acres lie too low or have too little inclination for the removal of rain-fall. These are sometimes actual swamps and sometimes lands lying so near the dead water-level as to be too much saturated for the production even of the best grasses. In these cases large and deep district drains or canals are required. Many of the States have drainage laws authorizing the execution of this work under the direction of State or County Commissioners at the charge of all who are to be benefited. These draining canals are sometimes of such width and depth as to be excavated by floating dredges working in from the body of water into which they are ultimately to discharge, and carrying a depth of water sufficient to float the apparatus quite to their upper ends, miles away. In this manner, districts subject to constant saturation are enabled to obtain the full benefit of their slight grades and to

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deliver their drainage outflow nearly at the level of the water into which their main drainage canal delivers. Lateral branches of the canal, extending on either side carry an effective drainage level throughout all parts of the district.

In other cases, lands of great area, requiring drainage, are dependent for their outflow on tortuous and sluggish creeks or rivers which are inadequate for the prompt removal even of the water of ordinary rains. The difficulty is often aggravated by the existence of mill-dams holding prescriptive rights along the lower reaches of the stream. In such cases, the mill rights have to be extinguished, and the water-course straightened and cleared, if not enlarged.

Again, wide areas of riparian marsh are rendered useless by their low level as compared with the tidal waters with which they are bordered. These are to be drained by excluding high floods, cutting off upland waters, and discharging on the fall of the tide. In all of these cases, the assistance of the engineer is in request and he will often find his knowledge, ingenuity and tact severely tried by an attempt to meet the difficulty effectively and economically. It is a simple matter to make a canal large enough, or dikes high enough, or to give ample water-way to obstructed water-courses, but the expense of all of these operations, and the charge for maintenance fall upon a class of men of little capital and of limited means for bearing the cost of the work. It becomes necessary, therefore, not only to make the ditch large enough but to make it not too large; to make dikes effective but neither too high nor too broad, and to limit the improvement of the natural water-courses to what is really necessary. A just balance must be struck between immediate effective drainage of the whole district, and such inadequate works as would drain the land too slowly for considerable practical benefit. It would, of course, be an advantage to place every acre of the whole district in such condition that it would be dry and firm within a few hours after the heaviest rain, but it would often cost five times as much to do this as to make such an outlet as will drain distant portions sufficiently for the production of good and wholesome grass, though too wet for reliable use for plough crops. The owner can better afford to take his chances of securing a fair crop of corn, with a certainty of good grass crops, than he can afford to pay the extra tax required to put his land always in condition for perfect tilth.

In the present condition of the agricultural district of the United States, there can be no doubt that a better return will be ensured for the amount of money laid out in the reasonably effective surface-drainage of lands now saturated, or, at times approaching a swampy condition, than an equal amount expended in the underdrainage of lands lying sufficiently high to make underdrainage profitable. In saying this, I would by no means be taken to imply that underdrainage is not largely profitable, and is not to be recommended in all cases where it is possible; only that while underdrainage increases and insures the product of lands now largely tillable, the surface-drainage contemplated gives value and product to lands now worthless, in the sense of not producing a sufficient return to pay the cost of cultivation.

UNDERDRAINAGE.

If a rule could be adopted which would cover the varied circumstances of different soils, it would be somewhat as follows: All lands, of whatever texture or kind, in which *the spaces between the particles of soil* are filled with water (whether from rain or from springs) within less than four feet of the surface of the ground, except during and *immediately* after heavy rains, require draining.

Of course, the particles of the soil cannot be made dry, nor should they be; but, although they should be moist themselves, they should be surrounded with air, not with water. To illustrate this: Suppose that water be poured into a barrel filled with chips of wood until it runs over at the top. The spaces between the chips will be filled with water, and the chips themselves will absorb enough to become thoroughly wet; this represents the worst condition of a wet soil. If an opening be made at the bottom of the barrel, the water which fills the spaces between the chips will be drawn off, and its place will be taken by air, while the chips themselves will remain wet with the water which they hold by absorption. A drain at the bottom of a wet field, in like manner, draws away the water from the free spaces between its particles and its place is taken by air, while the particles hold, by attraction, the moisture necessary to a healthy condition of the soil.

There are vast areas of land in this country which do not need draining. The whole range of sands, gravels, light-loams and moulds allow water to pass freely through them, and are sufficiently drained by nature, provided, they are as open at the bottom as throughout the mass. A sieve filled with gravel will drain perfectly; a basin filled with the same gravel will not drain at all. More than this, a sieve filled with the stiffest clay, if not puddled, will drain completely, and so will heavy clay soils on porous and well-drained subsoils. Money expended in draining such lands as do not require the operation is, of course, wasted; and, when there is doubt as to the requirement, sufficient tests should be made before the outlay for so costly a work is encountered.

There is, on the other hand, much land, which only by thorough draining can be rendered profitable for cultivation, or healthful for residence, and very much more, described as "ordinarily dry land," which draining would greatly improve in both productive value and salubrity.

The sources of the water in the soil are various. Either it falls directly upon the land as rain; rises into it from underlying springs; or reaches it through, or over, adjacent land.

The *rain-water* belongs to the field on which it falls, and it would be an advantage if it could all be made to pass down through the first three or four feet of the soil, and be removed from below. Every drop of it is freighted with fertilizing matters washed out from the air, and in its descent through the ground, these are given up for the use of plants; and it performs other important work among the vegetable and mineral parts of the soil.

The *spring-water* does not belong to the field — not a drop of it — and it ought not to be allowed to show itself within the reach of the roots of ordinary plants. It has fallen on other land, and, presumably, has there done its appointed work, and ought not to be allowed to convert our soil into a mere outlet passage for its removal.

The *ooze-water* — that which soaks out from adjoining land — is subject to all the objections which hold against spring-water, and should be rigidly excluded.

But the *surface-water*, which comes during rains over the surface of higher ground in the vicinity, should be allowed every opportunity, which is consistent with good husbandry, to work its slow course over our soil — not to run in such streams as will cut away the surface, nor in such quantities as to make the ground inconveniently wet, but to spread itself in beneficent irrigation, and to deposit the fertilizing matters which it contains, then to descend through a well-drained subsoil, to a free outlet.

From whatever source the water comes, it cannot remain stagnant in any soil without permanent injury to its fertility.

The only sort of drain to which reference is here made is that which consists of a conduit of burned clay (tile) placed at a considerable depth in the subsoil, and enclosed in a compacted bed of the stiffest earth which can conveniently be found.

A well-laid tile-drain has the following essential characteristics: 1. It has a free outlet for the discharge of all water which may run through it. 2. It has openings, at its joints, sufficient for the admission of all the water which may arise to the level of its floor. 3. Its floor is laid on a well-regulated line of descent, so that its current may maintain a flow of uniform, or, at least, never decreasing rapidity, throughout its entire length.

Land which requires draining, is that which, at some time during the year (either from an accumulation of the rains which fall upon it, from the lateral flow or soakage from adjoining land, from springs which open within it, or, from a combination of two or all of these sources) becomes filled with water that does not readily find a natural outlet, but remains until removed by evaporation.

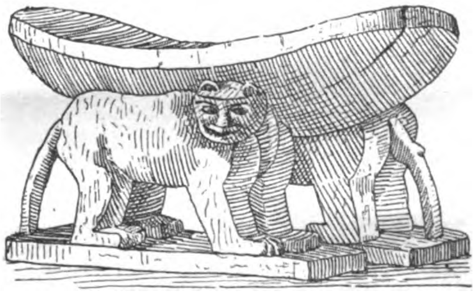
If such land is properly furnished with tile-drains (having a clear and sufficient outfall, offering sufficient means of entrance to the water which reaches them, and carrying it, by a uniform or increasing descent, to the outlet) its water will be removed to nearly, or quite, the level of the floor of the drains, and its water-table will be at the distance of some feet from the surface, leaving the spaces between the particles of all the soil above it filled with air instead of water. The water below the drains stand at a level, like any other water that is dammed up. Rain-water falling on the soil will descend by its own weight to this level, and the water will rise into the drains, as it would flow over a dam, until the proper level is again attained. Spring-water entering from below, and water oozing from the adjoining land, will be removed in like manner.

The water which reaches the soil may be considered under two heads:

1. That which reaches its surface, whether directly by rain, or by the surface-flow of the adjoining land.
2. That which reaches below the surface, by springs and by soakage from the lower portions of adjoining land.

G. E. WARING, JR.

INJURY TO COAL BY SPONTANEOUS IGNITION.



A Peruvian Wooden Seat.

THE questions pertaining to spontaneous ignition of coal have received the most extensive treatment from the various boards of investigation which have considered the subject. A recent American fire due to this cause brings to light a new feature in regard to the subject. The facts in the case were that about five thousand tons of semi-bituminous coal, which were kept in two brick houses, ignited spontaneously in the early autumn, about the middle of September, the fire being discovered in the two houses within a couple of days of each other. From the indications on the top of

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the pile, furnished by the smoke curling in various places, it was apparent that the fire had extended throughout the whole mass; and the deposition of sulphur on the surface of the pile, as it condensed from the volatile matter rising from the interior of the pile, presented the appearance of a yellow dew. Of the injury to the building by the heating of heavy brick walls to dull redness, and the burning of all timber in contact with the coal, we have nothing to do; but the method adopted by the underwriters in the settlement of the loss was certainly outside of the usual course taken in such matters. This is, we understand, either to settle the loss on the basis of a lump sum, which one party tries to increase and the other to diminish, until in the spirit of exhaustion rather than compromise, they settle on an average; and the other plan is to pay for the coal, and then sell it to small consumers by forcing the consumption by means of ruinously low prices, which do not reward the seller, and also interfere injuriously with the retail business in the vicinity. The method used in this instance was to take a sample of the coal from a portion which was uninjured, and subject it to chemical analysis, which gave:

Carbon	76.50
Hydrogen	3.98
Mineral matter	12.13
Sulphur combined with iron	.79
Sulphur inorganic compounds	.69

The calorific value of a pound of this coal as computed from the above, equals 13,594 thermal units. Other samples were obtained from the average of the pile when about half of the coal had been removed to a yard, leaving an oblique plane, which cut through approximately the centre of the mass. These samples were collected from regular points over the slope, and taken to a clean pavement where they were crushed and thoroughly mixed over to obtain a smaller sample for the purpose of analysis, which should represent the average composition of the coal throughout the whole slope. This analysis gave:

Carbon	74.13
Hydrogen	3.95
Mineral matter	13.18

The calorific value of this sample of coal amounted to 13,230 thermal units, or 2.68 per cent as the depreciation of the value of the coal by heating, and it was upon this basis that the loss upon the coal itself was reached. A sample of partially coked coal, which represented an average sample of the coal actually injured by heat so as to make a noticeable change in its appearance, showed upon analysis:

Carbon	65.77
Hydrogen	1.36
Mineral matter	26.13
Sulphur total	.82

The calorific value of the coal amounted to 10,409 thermal units, or 22.7 per cent less than that of the uninjured coal. The cause of the heating was undoubtedly due to the presence of sulphur in its combination with iron, forming iron pyrites. A defect in the consideration of the liability of various forms of bituminous coal to spontaneous ignition, has been due to considering the total amount of sulphur as the measure of hazard, an assumption which contains two errors sufficient in themselves to render that process of forming an opinion entirely unreliable, because the sulphur liable to produce heat by chemical changes under normal conditions is the sulphur in combination with the iron, forming iron pyrites. Th's disintegrates under the most ordinary conditions, while the sulphur in organic compounds is not liable to such changes. Secondly, a measure of this liability is not shown by an ordinary chemical analysis, which represents a sample selected by averaging up a large number of specimens, but the danger is due to the greatest concentration of iron pyrites, and not to its average presence in the whole mass.—*Engineering.*

A GOVERNMENT TESTING-STATION.

THE following memorial was submitted to the Washington Chapter by Mr. Cluss, and it was unanimously determined that it be incorporated in our annual report, with the request that the Board of Trustees, or the Convention, take the necessary preliminary steps to bring the matter before Congress:

MEMORIAL ON THE ESTABLISHMENT OF A CENTRAL TESTING-STATION FOR BUILDING MATERIALS IN THE UNITED STATES.

The building interests of the country have assumed such vast proportions and important bearings on life, limb and health of the people, as to demand a commensurate organized recognition from the Government, such as has been awarded in the past to commerce, shipping, manufactures, agriculture, mining, education, transportation, and, sporadically, to specialties, such as ores, metals, victuals, drugs, etc.

Consistent steps should be taken without delay towards relieving the representatives of the building interests from an isolated position and unsatisfactory dependence upon partly antiquated hand-books, or incomplete new publications prepared by private enterprise, with diligence and ability, but, without adequate financial and technical resources and scientific support for keeping abreast the exacting demands of a progressive age, in the midst of a prosperity in building enterprises and engineering feats, without any precedent in the world's history.

While fully appreciating the valuable work of the Franklin Institute in Philadelphia, of Prof. Thurston in Hoboken, the wholesale crushing of specimens of cements and stones, with the 200-ton Government testing-machine at Watertown Arsenal, and valuable tests made by officers of the Engineer Corps, United States Army, it cannot be denied that much valuable information is scattered so as to be inaccessible, in many cases forgotten, wasted or lost, and, on the other hand, that the ground is, in various directions, not covered at all.

The same difficulties, though in a minor degree, have been encountered in the older, long-explored, principal countries of Europe since the present wonderful activity in works of architecture and engineering has set in.

The solution has been found in the establishment of special institutions—testing-stations for building materials, which have proved to be safe regulators for the restless work.

For safe building, the statical coëfficients of strength and elasticity of the materials must be ascertained and controlled, whenever a case of importance occurs. The hardness and durability of building stones from newly-opened quarries, or new strata of old quarries, must be tested and steadily observed. The construction, into which different materials are combined, must be considered in connection with the magnitude and action of the opposed forces, and the best conditions for using the obtained factors must be determined.

The practising architects cannot attempt to perform such labor in order to obtain needed information. The quarry and other material-men need likewise facilities for obtaining reliable tests of newly-opened deposits of raw materials, as guides for the best methods of producing and manufacturing them. All these data, experimentally determined, form the basis of the judicious use of the building materials.

In our case, a central head-station ought to be founded by the Federal Government as a nucleus for harmonious methods and guidance of local institutions to be maintained by States, or large central cities, East, West, North and South. This central station, too, is under the lead of professional specialists of highest standing, so as to insure at the outstart, the confidence of authorities and citizens in the straightforwardness of the tests and experiments. Liberally fitted out with apparatus and laboratory accommodations, the technical expert, physicist and chemist, are to promote each other's ends by mutual support, and, at stated intervals, by consultations with practitioners, called in for the purpose.

Besides attending to the tasks delineated above, the officials of the stations are generally to determine, according to a moderate scale of rates, the quality of materials for interested parties, *from their uniform points of view*, and, in case of litigations, may be called to give opinions or make decisions of weight. To protect the interest of inventors or other private parties, the officials of the station are to be sworn to keep such orders private, unless the interested parties give their assent to publicity, when they may be published in the annual reports of the station, if of sufficient public interest.

Strength and properties of quarried stones, flagging, burned and unburned artificial stones, cements, limes, plaster-of-Paris, builders' felts, asbestos fabrics and other fireproof materials, pipes, wire-ropes for elevators, wrought and cast iron columns and beams, corrugated metal, strength of brickwork, masonry and joints, stability of brick and stone piers, are among the objects within the range of the station. Tests on the lasting qualities of paper and ink for public documents and similar work may come in as incidentals.

Based on the initiative of the *Institut Statistique* of France, improved central stations with branches in large cities, are in successful operation in Switzerland, Germany, Austria, Russia, etc. Prof. Tetmeyer in Zurich, Dr. Boehme and Martens in Berlin, Prof. Bauschinger in Munich, and others here have already made their mark in developing the resources of their countries, and in advancing sound knowledge of universal importance. It is for the proposed station to scan the vast field, add to the stock by original experiments with the resources available in this country, and bring and keep results in the best shape for use in practice.

It is essential to arrive at recognized uniform classifications, under which systematical gradations of the different groups of building material are to be arranged according to their most important properties, and to establish binding rules for tests of quality and precise conditions for the delivery of materials.

The testing-station, in Berlin, is equipped for tests of material in hot, cold, dry, wet or changeable state. It owns hydraulic presses with varied capacities up to 320,000 pounds, and facilities for inserting test pieces from the minutest sizes to large sized columns of brickwork, masonry, etc.

There are accommodations for determining specific gravity, porosity and hygroscopicity.

Machines based on combined leverage system for tests of tensile, compressive, transverse, sheering and torsional strength.

Machines for testing materials under often repeated strains.

Atwood's machines for testing resistance to live forces.

Presses for testing pipes exposed to internal pressure up to 500 pounds per square inch.

Machines for determining the abrasion of paving materials by wear.

Apparatus for microscopic tests and photography.

Apparatus for analyses of organic and inorganic substances, fuels, oils, etc.

The European institutions are due to the initiative of the National Societies of Architects and Engineers. It is suggested that the American Institute of Architects ask the coöperation of the American Society of Civil Engineers, and, perhaps, also, the Society of Mechanical Engineers, in memorializing and prompting Congress on this important subject.

Respectfully submitted,

GLENN BROWN, *Secretary* W. C. A. I. A.

BOOKS AND PAPERS

MR. GARDNER'S ideas on buildings of any sort are always those of a well-read and experienced architect, applied with much ingenuity and success to the problems he sets himself, and, above all, expressed with a simplicity and clearness which seem peculiarly adapted to carry conviction to the layman's mind. For this reason, principally, all his books have done the profession good service as tracts, opening what we may call the heathen intelligence to the light of good taste, adaptation to circumstances, and solid construction which so many of us, less gifted than Mr. Gardner, have hitherto preached in vain. It is possible that his book[1] on school buildings may prove less popular than one on dwelling-houses, since every one takes an interest in his home, while most people know nothing and care less, about the structures in which their children's souls and bodies are being trained, but that does not make the subject less important, and if Mr. Gardner's earnest and attractive writing shall serve to call public attention in some degree to it, he will have deserved well of his fellow-citizens. We need hardly call attention to the details of the advice which he gives his readers, as nearly all the points mentioned are familiar to architects who have made any study of school buildings, but something should certainly be said in regard to the pretty sketches which form a large part of the illustrations.

GRIMSHAW'S "*Pump Catechism*"[2] is a handy little volume of 230 pages, intended not so much for specialists as for those who have occasion to use technical knowledge only at rare intervals, and feel the necessity for a ready-reference book on the subject. It is a good work for that ubiquitous character found around all large buildings and dubbed "the engineer," for lack of a better name, who is supposed to know about everything that has to do with machinery in any form. It would also be of service to employers who know nothing themselves, but like to ask posing questions of their employés, and need some good authority to back them up in case the employé should turn about and pose the questioner. The information is imparted entirely in the shape of questions and answers relating to nearly all the pumps in the market, their construction, how they are set up, repaired, taken apart, etc. There are also points in regard to the general subject, the kinds of pumps, valves, principles of atmospheric action, calculations, and kindred topics. The answers are concise and complete as far as they go, and are supplemented by quite full illustrations and a cross index. The value of the work as a scientific treatise is quite small, and it would probably be of more interest to the so-called "practical mechanic" — who usually possesses a minimum of real knowledge — than to any one else; still, for its purpose, the book is well worth all it costs.

DR. LÜBKE, in his latest undertaking,[3] continues in a field that has been much worked, especially in recent years and in Germany. Contemporaneously with his "*History of German Art*," there are appearing under the same title carefully prepared publications by Dr. Janiteschk and Professor Knackfuss, the latter's richer in illustrations than Lübke's work, and affording a practical aid to rapid reference by the employment of smaller print for detailed description than is used in the text. The name of Dr. Lübke, however, assures a ready welcome for his history, and it is not surprising to learn that the subscriptions (all works on art in Germany are published by subscription) have reached already in a few weeks a number that is highly gratifying to author and publishers.

Dr. Lübke's reputation has risen with a steady and equable growth, and has spread into countries and among classes where the names of Woltmann and Schnaase are known only to a few. The chief of German art critics passed through a long time of obscurity and want of favor. Kugler is thought to have enjoyed an enviable success in his time. Yet Kugler's "*History of Painting*," after going ten years before a second edition was called for, met with failure in the third, published in 1867, thirty years after its first appearance; and his "*History of Art*," in which the attempt was made for the first time to represent the development of art in connection with the great epochs of political history, did not become popular until three decades after its publication.

Dr. Lübke's books have met with an exceptional fate. His "*History of Art*" went through seven editions in sixteen years, and his "*History of Architecture*" five in twenty years.

The "*History of German Renaissance*," less known in America and England than the last mentioned, and its companion, the "*History of Sculpture*," found a public as soon as they appeared; and later, when Germany revived her industries on recovering from the exertions and the ruinous results of financial speculations that followed the wars with Austria and France, the "*German Renaissance*" was even made a text-book, and the authority for the movement that swept over the country and incited the present reigning taste for *Alt-deutsch:* all without detriment to his reputation in the regard of scholars, the proverbial good luck of Lübke hindering the many exaggerated and absurd outgrowths of the movement from being laid at his door.

Dr. Lübke's enthusiasm for things German, while unremitting, is tempered. Nor has he any impassioned votaries. Rather, he is left apart in the contention of champions over the historians of their special affections, as claiming absolute devotion from few or none, but having his compensation in the respect of all. Not striving for the first place at the head of learned archeologists, he takes a second by general consent. Those who would rank him on a level with the first two or three living German historians and critics of art are hardly fewer than those who would refuse to place him next after them. The appreciation he meets with is of a popular kind, while the extent of it is declared by the successive editions his books all go through.

It is Dr. Lübke's merit, while not gifted with poetic talent, to have cultivated a clear style. The objects of his dissertations are works of creative genius, so that, with this medium of expression, they furnish often of themselves the warmth and glow that inheres in art, and which is justifiably looked for in descriptions of works of art. He is far from conveying the sense of unabating, joyous research and appreciation that forms the charm of Winklemann; as far, perhaps, is he, on the other hand, from the dry antiquarian habits of mind in which an object loses its attraction as soon as it has been capably dated and labelled. Lübke's research is rather that of the modern author; it is undertaken with a practical aim, and, when this has been conscientiously fulfilled, he is done, not with the thing, but with the relation in which he had for the time being set it. Unlike the mere antiquary, he is able to return to it again with fresh interest. He changes his points of view, and a new perspective incites him to further attentive investigation. The results of his study he uses to exhaustion; but he has the journalistic economy, so to speak, and does not give too many of them at one time. His popularity has no other secret than this practical division of his material. Each of his histories is divided into a few parts only, and the examples and descriptions that are furnished, although abundant, are never excessive and drawn out to a tedious length. Whatever knowledge remains over from one work is embodied in another, local and antiquarian details being often given to the world of specialists in the form of monographs. Dr. Lübke, in brief, is content to use his learning, rather than bent upon displaying it. Readers of his books feel that his last word is determined by the measure of his sense of propriety, not by his conception of their superficiality nor by his own ability to give.

These reflections occur in respect of Dr. Lübke. A review of the "*History of Germanic Art*" recalls them the more readily, perhaps, because the virtue of economizing material is stretched in this, his latest work, to a point beyond that of any in his previous productions, and beyond which no historian can go and retain anything like fulness of composition with clear relief of parts.

The subject of jewels of gold, silver, bronze and iron, found in graves, and that of miniature painting, the chief characteristic of which is variation of geometrical designs, together with the flat surfaces of the metals — "a peculiarity to be traced back to the habit of carving *in wood*" — may be illustrated by a restricted series of examples, which, in their turn, are concisely described. But so important a work of early architecture as the monument of Theodoric at Ravenna, with its flat stone roof, composed of a giant monolith of Istrian limestone eight thousand centners in weight, merits, we think, a fuller exposition than that it was a "thought originating in the Germanic times of yore." This is especially true when, as is the case, the only mention previously made of the "Germanic times of yore" in respect of architecture is that the houses of the early Teutons were *of wood*, and not of stone. Indeed, Dr. Lübke here is betrayed by his conciseness into obscureness, and even into contradiction; for Germans, he tells us on an earlier page, were natural carpenters, and not masons, in support of which, among other facts, he mentions the philological proof of the words that are connected with carpentry being Germanic by origin; whereas such as describe the material and labor of masonry — *Thor, Dach, Mauer, Kalk,*

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[1] "*Town and Country School Buildings.*" A collection of plans and designs for schools of various sizes, graded and ungraded, etc. By E. C. Gardner. New York and Chicago: E. L. Kellogg & Co., 1888.

[2] "*The Pump Catechism,*" by Robert Grimshaw, M. E. New York: Practical Publishing Co., 5 Dey St.

[3] "*Geschichte der Deutschen Kunst,*" von Wm. Lübke. Stuttgart: Ebner und Seubert, 1888.

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Cement, Strasse, Pflaster — are derived from the Latin tongue. The illimitable forest offered abundant raw material, and "our ancestors may have felt doubly comfortable in a shelter won from the familiar wood."

As there is no mention made of earlier examples of stone roofing to support the sudden assertion that the monolithic covering of Theodoric's tomb was a Germanic idea, so Dr. Lübke fails to refer by way of chronological illustration to early examples elsewhere. The date of Theodoric's monument falls within the first two decades of the sixth century. If a roof of stone belonged to the "arrangement" of German architecture at that period, it would be of interest to hear how Dr. Lübke would explain the fact that in England the introduction of stone for roofing occurred so late; for, if we except the Druidic remains, the first appearance of stone roofs dates in the twelfth century, when Alexander caused Lincoln Cathedral to be restored with such subtile skill, as John of Huntingdon declares, that it seemed to be fairer than when it came from the builders' hands, and which, Giraldus expressly informs us, was "the first to receive the firm and noble covering of stone vaulting."

We cannot have mistaken Dr. Lübke's word *anordnüng* as applying to the roofing, whereas it refers to the general plan of the monument. The plan, he says, is essentially Roman in "*Anlage und Construktion.*" The ground-floor forms a cross inside, but shows without a decagon. The wall is composed of immense blocks of limestone, the plain and solid construction of which is enlivened by round-arched niches of considerable depth. A single door opens into its interior. The upper story is round, and is smaller in circumference than the lower portion. Originally, it was girt by an arcade, the joints of whose arches are still visible, and gave, no doubt, to the dignified and massive pile the look of life and the touch of grace which the present building is wanting in.

The cornice of the roof is a bone of contention between our author and the learned director of the royal archives in Berlin, Dr. Dohme. The latter gives it over with the rest to Roman art, and calls the ornamentation "misunderstood Classic details." Besides the familiar head and ovolo patterns that occur, there appears a form as the principal decoration of the upper portion of the cornice, that is described by Dohme as the pincers pattern. Dr. Lübke sees in the form an example in sculpture of the play and combination of lines that is characteristic of Germanic jewelry and miniature ornamentation, and claims the pattern, accordingly, for German art. Two flights of stone steps outside the monument lead in a broken range from the ground to the arcade above, where they meet in front of a doorway in the circular upper story, directly above the portal in the massive angular wall of the basement below. Although restored in the past century, the structure of this stairway is antique in the main.

The sarcophagus of King Theodoric, which, according to a tradition, is the same that is now seen built into the face of the palace wall at Ravenna, is supposed to have originally occupied a place in the middle of the ground-floor. An opening in the centre of the vault formed a connection with the upper portion, so that we have in the monument "*the first example of the double-chapels of the Middle Ages.*" Small slits in the masonry allow of the faint passage of light into the tomb, while miniature arched windows, single, and separated by spaces not at all too great, illuminated the interior of the upper or chapel floor. The latter was provided at first with light from above, according to one old account, but the opening was covered later by a cenotaph of slate under a baldachino that was exalted on pillars.

The only existing building in Germany of the same epoch as the monument in Ravenna is the Cathedral of Triers.

The illustrations of this, as of the tomb, are good; whereas those of the monuments of Charlemagne's time, such as the Cathedral of Aix-la-Chapelle, seem to be from old plates that are somewhat worn.

Countess v. Krockow.

COMMUNICATIONS

TWENTY-EIGHT STORY BUILDINGS.

Minneapolis, Minn., 1888.

To the Editors of the American Architect: —

Dear Sirs, — In your last issue, in an editorial which has for its text the contemplated twenty-eight-story building in Minneapolis, you speak at more or less length of the difficulties arising from unequal settlements, etc., evidently assuming that the structure is one of brick, stone and mortar, whereas this is exactly what it is not.

As has been before described, it is a braced and riveted rolled-steel frame not unlike four bridge trusses stood on end and fastened together at the four corners, and having sway bracing in the shape of stiff floors once in eleven feet from the foundation to the top. To prevent the contraction and expansion, sure to be present in a mass of such huge proportions, it is wrapped, so to speak, with a thick covering of a non-conducting substance and this in turn by a thin veneer of stone. This stone is prevented from settlement by being carried by shelves at each story; making each twelve feet in height independent of the balance of the stonework and reducing the settlement to virtually nothing. As a further safeguard — careful, and I think accurate calculations show the entire weight of the structure to be less than one of the same area twelve stories high and built in the usual manner.

As to the cost, which you seem to think would be excessive, considering the result, the estimates of the various contractors show it to be about fifteen per cent less than an ordinary building of the same dimensions.

The solicitude which you display for the nerves of the tenants, I think hardly warranted as, owing to the peculiarly ridged construction, the effect of the ordinary earthquake would, presumably, produce only a motion akin to that of the mast of a vessel at sea, and a shock which might overturn the building would have of a certainty arranged the surrounding buildings as a nice soft spot for it to fall upon.

As to the matter of the man falling from one of the upper stories — I do not think that the party would very much care whether he fell from the twenty-eighth or the eighth story, and, in case he did, we probably should not know it unless by spiritualistic media.

Very respectually yours, L. S. Buffington.

"GIANT METAL."

Bridgeport, Conn., November 20, 1888.

To the Editors of the American Architect: —

Dear Sirs, — We do not think you properly represent us in the statement on page 228 of "*The American Architect and Building News*" that the "Champion" Metal is probably the same essentially as our "Giant" Metal. The Smith & Egge Mfg. Co., *claim* that "Giant" Metal *is essentially* different in its *superior* fibre and anti-frictional qualities, and claim, also, that their "Giant" Metal which is rolled exclusively for them, costs about forty per cent more than any ordinary metal before it is made into chain. We only suggest that you publish what *we claim.* We do not ask that you should vouch for it, we know it to be true, however, and take exceptions to your admissions that Champion metal is probably the same.

Respectfully yours, The Smith & Egge Mfg. Co.

SOME INITIAL CUTS.

Hartford, Conn., November 17, 1888.

To the Editors of the American Architect: —

Dear Sirs, — Will you kindly explain the interesting initial cuts on pages 206, 208 and 209 of your issue dated November 3?

Yours very truly, H.

[As the titles of these cuts were unintentionally omitted we are glad that H. has asked his question. The cut on page 206 shows an iron door-knocker and bell-pull handle at Nuremburg; the cut on page 208 shows a typification of the Trinity as painted on the wall of St. Pol de Léon. The cut on page 209 is styled the "Altar of the Twelve Gods" by the author of "*La Vie Privée des Anciens*" from which we borrowed it. — Eds. American Architect.]

TO DEMAND A CLERK-OF-WORKS.

Boston, Mass., November 12, 1888.

To the Editors of the American Architect:

Dear Sirs. — We want to thank you for the editorial in the *American Architect* for November 10, on the question of "clerk-of-the-works." The subject has been uppermost in our minds for some time, and we have arrived at a point where we have decided to make a break whether the others follow us or not, and frankly say that we do not superintend and that we are not paid enough for the work that we do. We feel that most architects pretend to superintend although they say they do not. Your remark some time ago that "an architect spent his time running about from town to town to see if his work had tumbled down since he was last there" first set us thinking. Then Mr. Atkinson's letter as to "Why architects did not show more energy in looking into new methods of construction," the editorials in the *Engineering Record* on the "Compensation of Architects," and the controversy over the Washington tower have all, in our mind, been due to the same cause: that is, that the architect of to-day is called upon to do so much for so small a price that he is compelled to neglect his work or starve.

We have written a new schedule which we propose to have well discussed before printing it, and which P— & Q— are now mulling over and they propose to join hands with us. Curiously enough, when going into Z—'s office to talk the matter over with him, we found X— there for the very purpose of discussing the question of compensation of architects, so that you see there is a strong current in favor of the new movement. Your editorial seems to us extremely well put. All classes of work must receive daily superintendence even if confined to a short period of each day, and all important work should have and must have a clerk-of-the-works constantly on the ground. We could enumerate no end of botches, careless work and criminal work which occurs and goes uncorrected simply because the architect does not see them, while the owner feels that everything is all right because the architect is looking after it, and the architect feels easy in his mind because, he says, "I am not paid to see every brick laid and every nail driven."

In our office when we stated to a client that a contractor was dishonest, whom he wanted to have figure on his work, he coolly said,

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"Well, what is the advantage of having a reliable architect if he is not to look after a dishonest contractor?"

Let us all pull together and make the public come to us.

Yours very truly, ——

COMMISSION ON A PARTY-WALL.

November 17, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Will you kindly favor us with your advice in regard to the following:

Two land owners who we will call A and B, own adjoining lots and agree that A shall build a party-wall and B will pay one-half the cost of same. A employs architect Y, who makes plans for his building and lets the contract for building the same, including the party-wall. B employs architect Z, who makes plans for a building on the adjoining lot, showing one-half the party-wall and arranges vent and smoke flues, corbles and ledges, etc., on his side of the wall which are built according to his plans and directions. Now the question is: Has architect Z a just and legal claim for commission on that part of the party-wall which is a part of the building for which he has made drawings, etc., but at the same time contracted for by architect Y? A reply would greatly oblige, Y & Z.

[IT is usual to pay the architect of each building a commission on the cost of the party-wall, so that this part of the building pays two commissions which is fair, since each architect must go to considerable trouble in looking out for his side of the party-wall. Whether each architect gets commission on the value of the whole wall, or only on the half that his client uses, is decided by circumstances. It is quite common for the owner who builds first, and who, of course, builds the whole wall, and pays his architect the usual commission on the full value of it, to charge his next-door neighbor, when he settles with him for the joint use of the wall, one-half of the architect's five per cent on the cost of it, as a part of its value. The second man then pays his architect five per cent on the cost of his half of the wall only. In this case the first architect receives his fee for the whole value of the wall, and the second for only half of it, which seems to us a very good arrangement, as the first architect superintends it, and thus performs an important service for the owner of each half of it, while the second architect only has to adapt to his plan, what is already built. — EDS. AMERICAN ARCHITECT.]

THE PRESCOTT DOOR-HANGER.

CHICAGO, ILL., November 26, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Please note that in your article on door-hangers, commencing on line nineteen, first column, page 219, November issue, you say: "The only objection to their use for parlor-doors, is that they have to be put in before the plastering is applied and they are somewhat less easily adjusted." In answer we say:

Our hanger "The Prescott" is the only one that is never applied, even in part, (all other hangers must put in track) before the plaster is put on, and is, further, the only one that can be put on old doors without disturbing plaster. Every day we take off the track hangers from old sliding-doors and apply our hangers instead, without disturbing the plaster or anything else. We do not drive a screw in the pocket, but do *all* our work on the face of the jamb.

It takes our carpenter from ten minutes to a half hour to adjust our hangers when the doors do not work freely, and so seldom is this at all necessary that we guarantee our hangers (in all cases where we apply them) to work smoothly and easily for at least five years from date they are applied; and always repair, free of cost, any of our hangers that may be faulty in their working.

We think in common justice to us you should contradict this statement, as, from the large circulation of your paper, it will do us much harm. We had a case in point to-day — a gentleman building here looked over your paper to find proper materials for his house — seeing your article on door-hangers he decided from the clause above quoted not to use the Prescott. However, we finally convinced him of your error and he will use the Prescott Hanger.

Yours truly, PRESCOTT HARDWARE & MFG. CO.

NOTES & CLIPPINGS

MALMAISON. — Malmaison, the famous château of the ill-fated Josephine de Beauharnais, is simply going by piecemeal to the dogs, or rather to the rats, and it has been admirably suggested that the place should be converted into a museum containing historical relics of the First Empire. In the beginning of the present summer Malmaison was offered for sale at an upset price of £10,000; but no bidder could be found. The park is now let out in small lots to builders, and hideous villas are arising around the château. The two façades of the mansion — that of the court-yard and of the garden — are intact, but the interior is like a barn. The *salon* of Josephine still exists, with its mural decorations of birds, and gilt flowers; and so do the dining-hall, the council-chamber — shaped like a tent — and the library; but the furniture is all gone, and the "pleasure-house" of old, is a melancholy wreck. It is to be hoped (the Paris correspondent of the London *Telegraph* remarks) that something will be done for the place in view of the approaching exhibition; for Malmaison was given to the State by Napoleon III, and was converted into a "Napoleonic Museum" during the World's Fair of 1867. The spot will be an interesting place of pilgrimage for the visitors to the exhibition, for Malmaison is to many more memorable than the Trianons at Versailles. Malmaison saw the triumph, the downfall, and the death of the "creole girl," who became Empress of the French. It was there that Josephine presided over the Consular Court, and it was thither that she repaired on the 16th of December, 1809, when the divorce was promulgated at the Tuileries which gave her place to the Austrian Archduchess. There, too, Josephine died in May, 1814, while Napoleon was at Elba; and when the conqueror himself was defeated at Waterloo, it was to Malmaison that he repaired, amid disaster and desolation. The property called Petite Malmaison is luckily in good hands. It is the summer seat of the Count de Bari, brother of the ex-King of Naples and of his Countess. The new occupant of the place has refurnished it in First-Empire style and has paid particular attention to the garden, in which Josephine used to amuse herself by planting flowers or pruning leaves. In this garden is still extant the gate through which Napoleon passed when he left Malmaison forever on his way to Rochefort, in order to give himself up to the English and to embark for St. Helena.

THE LATE T. GAMBIER PARRY. — Many of our readers will have heard with great regret of the death, on the 28th September, of Mr. T. Gambier Parry, at his house at Highnam Court. Mr. Parry was, as every one knows, one of the most noted and gifted of the band of amateur ecclesiastical artists and art-lovers who were part of the production of the great church revival movement of this century. Mr. Gambier Parry, however, was more fully and truly an artist than most of his compeers in the same band. His decorative painting at Ely Cathedral was a very important work, as well as his decoration of the church which was built at his own cost at Highnam; and his development of the spirit fresco process of painting was an important practical contribution to the technique of the art. It must be admitted, however, that the work at Ely and Highnam must be judged by a different standard from that which we apply to the leading artistic work of the day; it is essentially amateur painting, though amateur painting of an unusually high class. Mr. Parry's rather recently published volume of artistic essays[1] contained much beautiful writing on art, and is the index of a highly refined, sensitive and cultivated mind. Mr. Parry's personal manner and appearance harmonized remarkably with his artistic repute: he impressed one, as we heard it remarked, with the idea that he was one of the Italian Renaissance artists come to life again in the nineteenth century. He leaves a wide circle of friends by whom he will be regretted, both on public and private grounds. — *The Builder.*

PERSONAL EXPERIENCE OF AN ELECTRIC SHOCK. — Thinking some of the readers of *The Electrical World* might be interested in a personal experience of a shock by an intermittent current, I will give an account of one that occurred to me. On touching two terminals to close a circuit on some experimental apparatus, I thought of course I had grasped the insulation, but the bare end of a flexible wire managed to touch my right-hand fingers while I held the binding screw in the other hand. I was instantly thrown down and held perfectly rigid, unable to speak, it seemed to me, for two or three minutes, but probably twenty or thirty seconds would be nearer the actual truth. I felt unconsciousness coming on, when suddenly I became loosened and I lay perfectly limp a moment or so. I got up, but was scarcely able to walk, the pains being greatest in the hips. However, I got a voltmeter and found 140 volts on the circuit, and the alternations or intermittences were 150 per second, while I found my resistance, under the same conditions, to be 4,500 ohms. The wire that slipped out of my hand left a burn on my forefinger in the shape of an elliptical hole about 5-32 inch deep, and scarred the flesh about the hole at a radius of one-quarter inch. During the contact I felt difficulty in breathing, but five minutes afterward my skin was all aglow, as if a bath-brush and Turkish towel had been used vigorously, while the respiration became full and a trifle quickened. Two days afterward I was all right, except a little soreness all over. — *T. D. Bottome, in The Electrical World.*

ODE TO AN ELECTRIC LIGHT.

Twinkle, twinkle, little Arc,
Sickly, blue, uncertain spark;
Up above my head you swing,
Ugly, strange, expensive thing.

When across the foggy air
Streams the lightning's purple glare;
Does the traveller in the dark
Bless your radiance, little Arc?

When you fade with modest blush,
Scarce more bright than farthing rush,
Would he know which way to go
If you always twinkled so?

Cold, unloving, blinding star,
I've no notion what you are;
How your wondrous "system" works,
Who controls its jumps and jerks.

Yours a lustre like the day!
Ghastly, green, inconstant ray,
No; where'er they worship you
All the world is black or blue.

Though your light perchance surpass
Homely oil or vulgar gas,
Still (I close with this remark),
I detest you, little Arc!

St. James's Gazette.

[1] "The Ministry of Fine Art."

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Frost-proof Mortar. — According to the *Bautechniker*, Herr Heinrich Hausleitner, of Vienna (Meidling, Schulgasse No. 13), by adding a certain substance, renders gypsum, hydraulic lime, and Portland cement perfectly frost-proof. The effect of the addition is that those materials, even during the most severe frosts, set without freezing. The frost-proof materials, which are stated to have been found efficient, are used in the following manner in mixing mortar: — (1) *Frost-proof Gypsum Mortar.* — Three parts of good white lime mortar are well mixed with 1½ or 2 parts of frost-proof gypsum, but the quantity mixed must be used quickly, and the interval from the time of mixing to using the mortar must not exceed ten minutes. (2) *Frost-proof Hydraulic Mortar.* — Three parts of sand are mixed with 1¼ part of hydraulic cement lime, the necessary quantity of water is added, and the mortar mixed as quickly as possible, so that from the time of adding the water to the complete using up of the whole quantity of the mortar prepared no more than ten minutes elapse. If it is desired to add frost-proof hydraulic cement lime to white lime mortar, so as to cause the latter part to set and resist frost, one part and a half of frost-proof hydraulic cement lime is added to three parts of thin white lime mortar, the whole quantity of the prepared mortar to be used up within ten minutes of the time of adding the frost-proof hydraulic cement lime. (3) *Frost-proof Portland Cement.* — This is treated and used in the same way as frost-proof hydraulic cement lime. The frost-proof materials must be stored in a dry place, for damp causes them to stick to the barrel, and to become worthless for further use. — *The Builder.*

The Sound of Thunder. — One of the best descriptions of a common natural phenomenon is that recently given by M. Hirn, in which he says that the sound which is known as thunder is due simply to the fact that the air traversed by an electric spark — that is, a flash of lightning — is suddenly raised to a very high temperature, and has its volume, moreover, considerably increased. The column of gas thus suddenly heated and expanded is sometimes several miles long, and, as the duration of the flash is not even a millionth of a second, it follows that the noise bursts forth at once from the whole column, though for an observer in any one place it commences where the lightning is at the least distance. In precise terms, according to M. Hirn, the beginning of the thunder-clap gives us the minimum distance of the lightning, and the length of the thunder-clap gives us the length of the column. He also remarks that when a flash of lightning strikes the ground, it is not necessarily from the place struck that the first noise is heard. Again, he points out that a bullet whistles in traversing the air, so that we can, to a certain extent, follow its flight, the same thing also happening with a falling meteorite just before striking the earth. The noise actually heard has been compared to the sound produced when one tears linen. It is due really to the fact that the air rapidly pushed on one side in front of the projectile, whether bullet or meteorite, quickly rushes back to fill the vacuum left in the rear. — *Iron.*

A Gas Hammer. — John Bull uses a lot of iron in making tools, but he makes some mighty good ones — sometimes. A Scotch branch of an English machinery house has recently brought out a gas hammer which must prove very handy in the shop. Instead of steam furnishing the motive power, a mildly explosive mixture of common coal-gas and atmospheric air is employed. It is used to propel the hammer piston very much as in the cylinder of a gas-engine. Softer blows are given by reducing the range of movement of the hand-lever, and the force of the blow can be regulated as easily and accurately as with the steam hammer. The hammer is that known as the three-fourth hundredweight size, but the ordinary blow struck by it is equal to a weight of three hundredweight falling through a height of one foot; 3,000 blows only use thirty-three cubic feet of Birmingham gas which at 2*s.* 6*d.* per 1,000 cubic feet costs one penny, or 4,500 light and heavy blows can be struck for the same sum. The hammer is always ready for work at any moment, day or night, for short or long periods, and it works at the same economical rate for one blow as for 1,000. It is only necessary to light the Bunsen flame, open the gas-cock, and it is ready for action. The hammer is arranged to work with hand-gear, but if preferred it can be arranged to work with foot-gear also. Yankee ingenuity has no business to let cousin John get ahead. We can find an excellent use for gas hammers where there is no steam-supply available. — *The Boston Manufacturers' Gazette.*

Canada's Ship Railway. — Mr. Ketchum, engineer and promoter of the Chignecto railway, which is to connect the waters of the Bay of Fundy and straits of Northumberland, is trying to complete arrangements with the government in connection with his works, for which Parliament at its last session granted him a subsidy of $170,000 per annum for twenty years. Mr. Ketchum says that all contracts in connection with the enterprise have been awarded and operations commenced all along the line. The railway is estimated to cost $5,500,000, and is expected to be finished by September 1, 1890. Docks are to be constructed at either end for the reception of vessels before they are transferred to the railway. That at the Bay of Fundy end will be 300 x 600 feet, and the one at Chignecto will be 800 feet long, in addition to which there will be a lifting dock 200 feet in length. At the Bay of Fundy there will be an hydraulic lift which will lift and lower vessels forty feet. The construction of the docks will be more costly than that of the railway itself at Baie Verte, where the water is at present very shallow. The channel will have to be bridged at the Bay of Fundy, and there will be a gate to impound water sufficient to float vessels of twenty-five feet draught. The railway altogether will be seventeen miles long. When the vessels are lifted from the locks they will be placed upon cradles made to adjust to the side of the vessels, and these will extend over four steel rails of the weight of 110 pounds to the yard. Under a large vessel there will be about 200 wheels. — *Boston Herald.*

Oxford University. — The English University of Oxford has twenty-one colleges and six halls. The halls differ from the colleges in not being incorporated and having little or no endowments. There were at one time more than a hundred halls. The colleges are as follows: University, Merton, Balliol, Exeter, Oriel, Queen's, New, Lincoln, All Soul's, Magdalen, Brasenose, Corpus Christi, Christ's, Trinity, St. John's, Jesus, Wadham, Pembroke, Worcester, Hertford and Keble. The halls are: New Inn, St. Edmund, St. Mary, Charsley's and Turrell's. — *The Christian Observer.*

Sticking Paper to Metal. — Paper pasted, gummed, or glued on metal, especially if it has a bright surface, usually comes off on the slightest provocation, leaving the adhesive material on the back of the paper, with a surface bright and slippery as ice. The cheaper description of clock dials are printed on paper and then stuck on zinc; but for years the difficulty was to get the paper and the metal to adhere. It is, however, said to be now overcome by dipping the metal into a strong and hot solution of washing-soda, afterwards rubbing perfectly dry with a clean rag. Onion juice is then applied to the surface of the metal, and the label pasted and fixed in the ordinary way. It is said to be almost impossible to separate paper and metal thus joined. — *English Mechanic.*

TRADE SURVEYS

With scarcely an important exception, business in all branches has fallen off since November 6. No reasonable explanation has been offered by those writers who are ordinarily so quick to detect underlying causes. Prices have not suffered in any direction. Distribution at retail is progressing finely. The markets are all active. No advance will be made on standard articles of consumption for the spring. The point at present in dispute in trade and manufacturing circles is: Will prices decline between now and spring? This uncertainty is the real cause of the lull. So many interests are preparing to increase capacity and output, that buyers take both hope and alarm at the prospects. If there is anything to be gained by delay they intend to have it, and hence stocks of nearly all kinds of merchandise and raw material in second hands are going down, and are not being made up. This policy may continue up to the close of the year. Jobbers and manufacturers complain at it because it leaves them in the dark, whether to push business and accumulate goods or not. If they adopt the first alternative and manufacture ahead of orders, buyers will take advantage of this fact to crowd down prices under threats of buying elsewhere, and under intimidations that entirely too much has been manufactured. Manufacturing interests do not accept the possibility of lower prices, but, in many quarters, believe a higher range is probable. Dry goods, clothing, carpets, boots and shoes, hardware and house-furnishment remain where they were, though manufacturers have agreed to advance carpets two and one-half cents, which means ten at retail. The conviction among manufacturers is that an upward tendency will do harm, and in textile channels they are endeavoring to guard against the effects in the advance on wool at home and abroad. In the heavier industries, there is no room for doubt as to the future satisfactory condition of trade, excepting as to railroad building. Perhaps never before was as much engineering work on hand and contemplated. All our great machine-shops, car and locomotive works, and most of the merchant steel works continue crowded with orders. November railroad earnings show a falling off on fifty-nine roads of 4.16 per cent cotton exports to date, 1,365,432 bales, against 1,725,131 bales last year. Bread-stuffs exports are also far behind last year, the decline in flour being as 28 to 20, wheat 11 to 4. Traffic rates will probably be restored on many Western lines, though matters are far from being on a permanently friendly basis. A meeting of trunk-line presidents was held at New York this week. The inactivity in funds is shown in an increase in surplus reserves at New York to double the amount held a year ago. Currency is equal to all requirements, and foreign investments continue on a liberal scale.

Leading agricultural and implement manufacturing authorities West have expressed the belief that there will be a greater increase in the agricultural area next year than ever. Farmers and cotton-planters are buyers of and lookers after a great deal of special machinery and appliances. The leading agricultural-implement people West and Southwest of St. Louis are preparing for a good year. Possibly, the activity is no more than what is usually to be expected, but it is of such a magnitude as to excite comment. Another evidence of healthful conditions is the active demand for crude iron, especially in the West. Southern furnaces are selling all they can make. Of course, the possibility of getting ahead of the market is always to be kept in sight. Users of copper are watching syndicate operations with increased interest, in consequence of the accumulation of European stocks from 48,503 tons October 1, 1887, to 93,988 tons November 1. They do not lose sight of the fact that new sources of supply are adding to the stock available. Observers of commercial and industrial movements have, of late years, been struck with the timely action of recuperative agencies that come just when needed to prevent or allay some evil threatened. Last spring, as if with one accord, production was widely restricted and with advantage to all interests; a like dulness has set in at this time, but it may not last longer than the holidays. The greater controlling intelligence prevents blind expansion and production. Meanwhile, new interior markets are being developed and the purchasing-capacity of the people at large is greater. This self-correcting tendency is noticed by those who control aggregated wealth and capital, and it strengthens their confidence in the prosecution of new enterprises. New York financiers say that the conditions are more inviting for enormous investments in industrial channels than they ever have been, and reputable railroad authorities in Boston predict that within a few months American investments in railroad securities will increase very much. Much, they say, depends upon the harmonizing of the theory and the practice of railroad legislation. The railroad interests are at present passing through a trying ordeal, and if railroad managers can obey the laws and prosper, a new field for investment will open up. There are signs of movements among various branches of manufacturers to perfect their organization and to extend them into new manufacturing sections. What has been gained will be rendered secure. Manufacturers see great advantages in future political contests by bringing the new industrial communities up to their standard. An educational work will be carried on as far as possible, so that the leverage of the mere politician will be shortened through greater enlightenment when it comes to decide again what shall be the fiscal policy or the economic policy of the Government.

S. J. Parkhill & Co., Printers, Boston.

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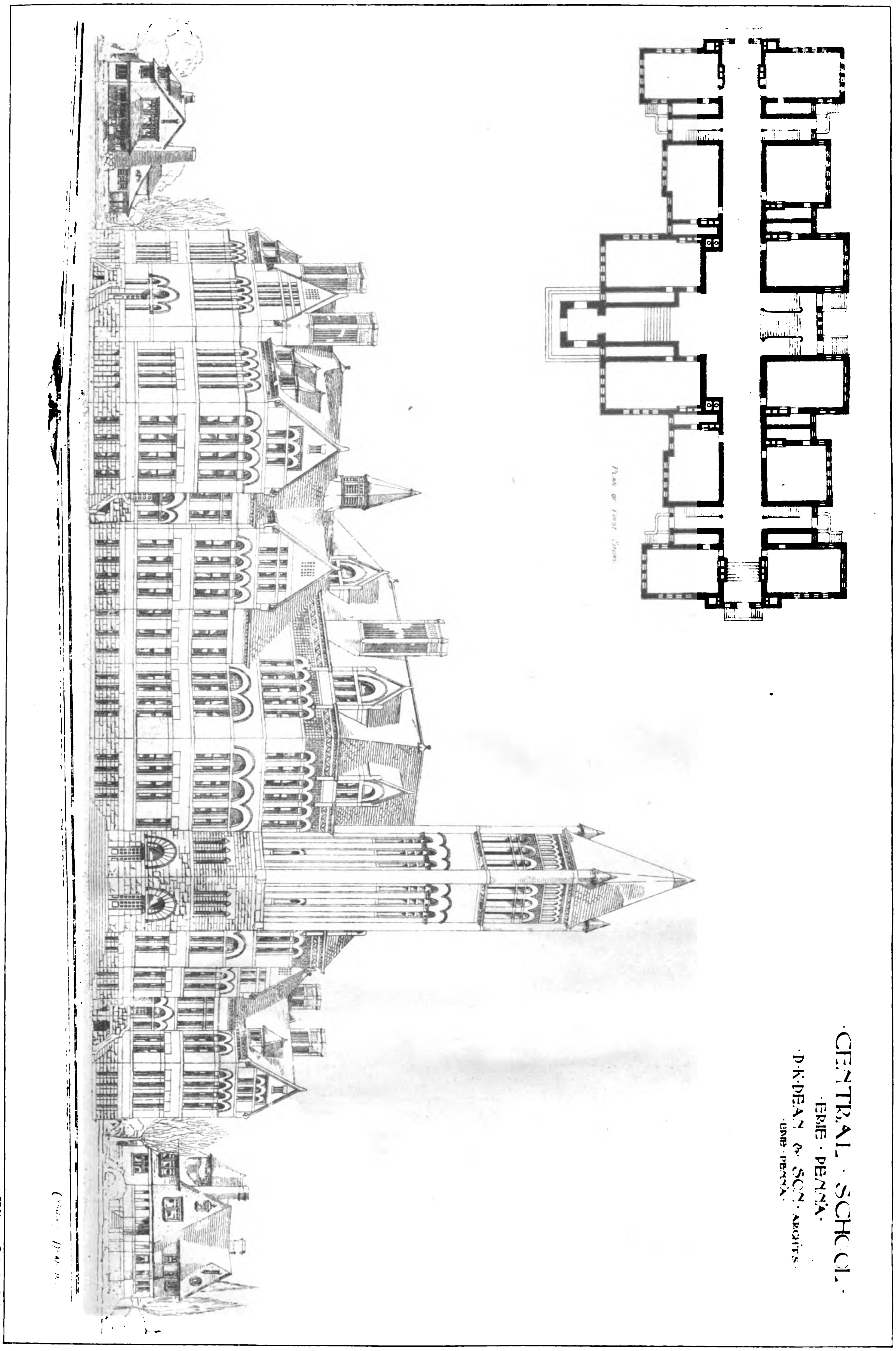

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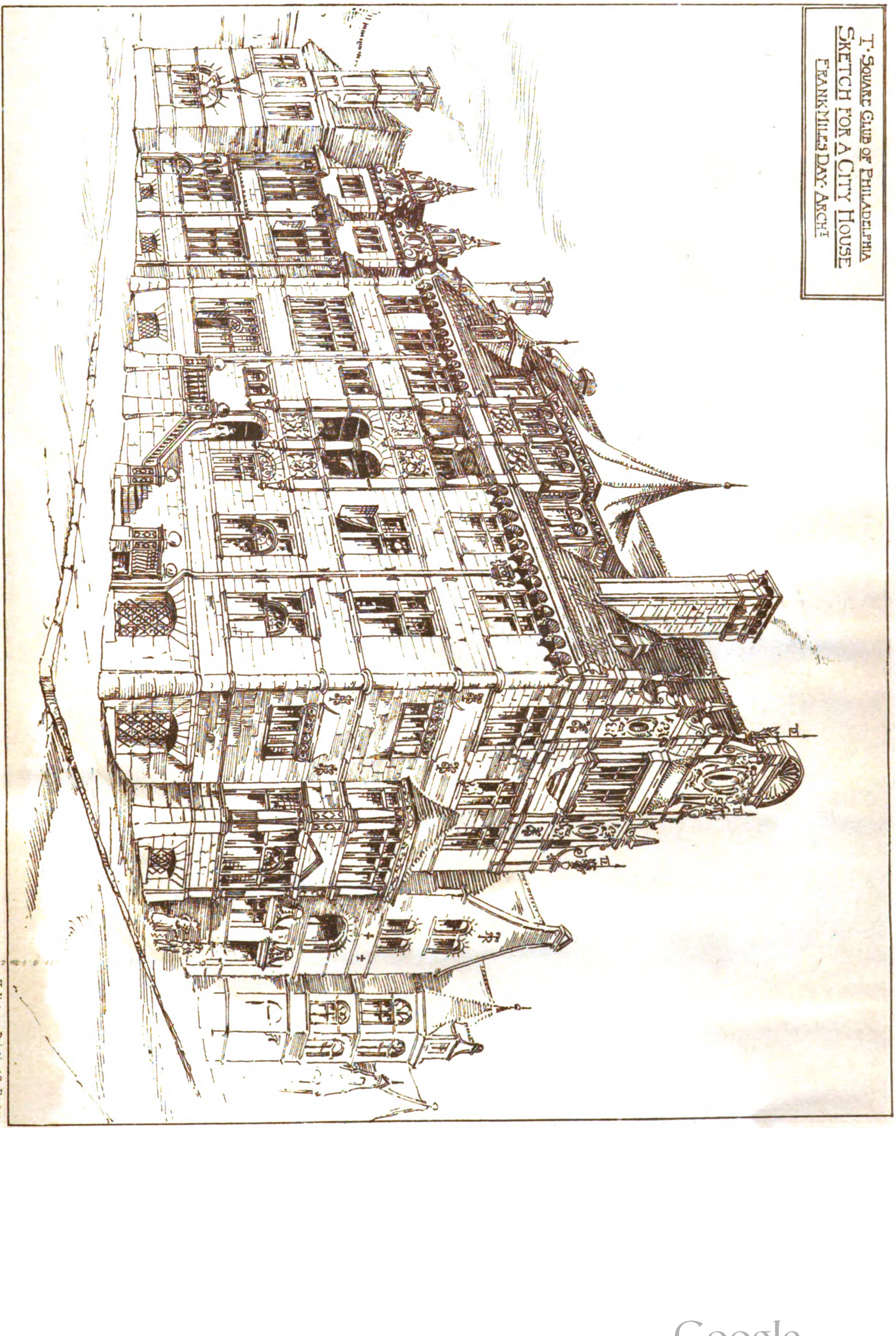

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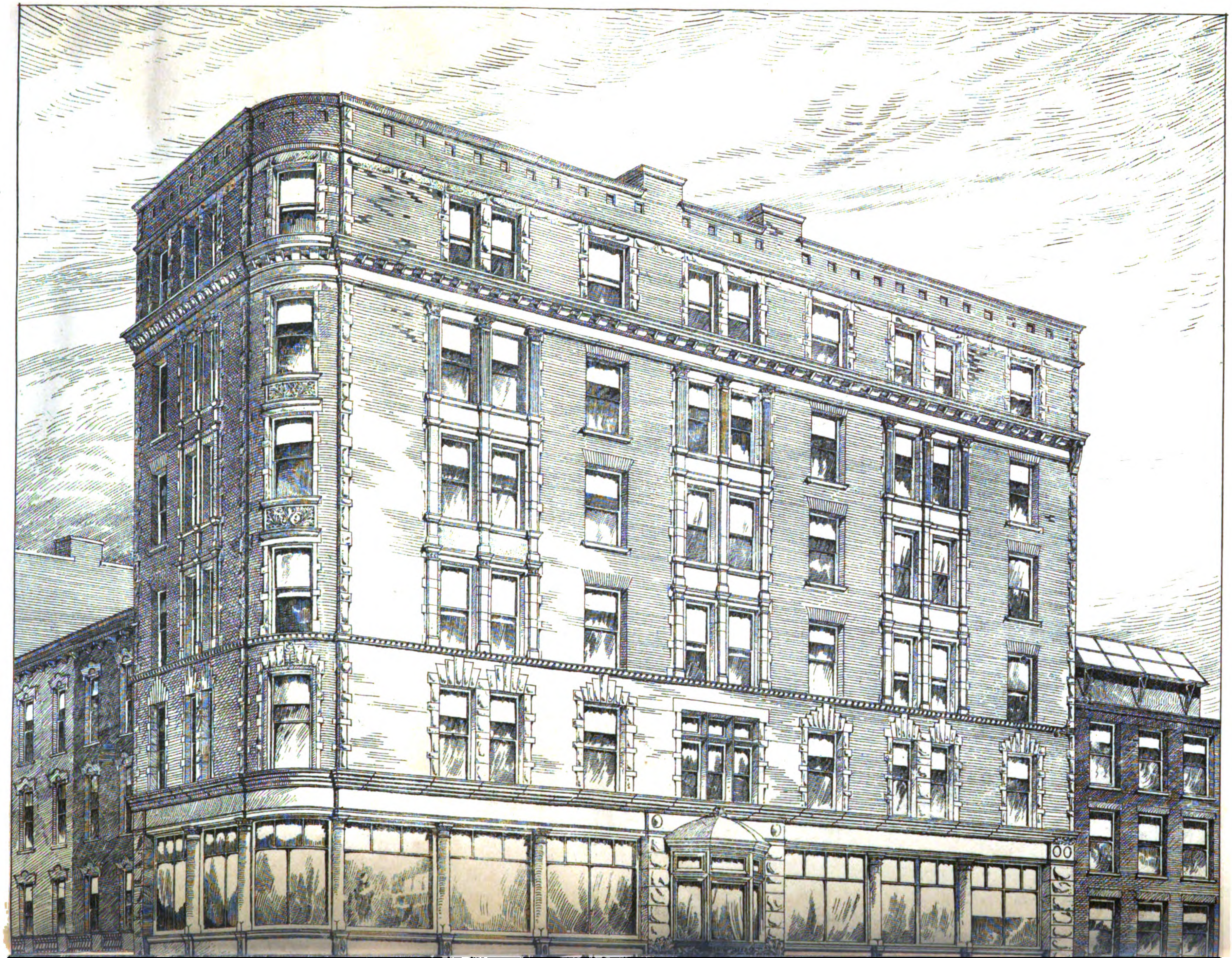

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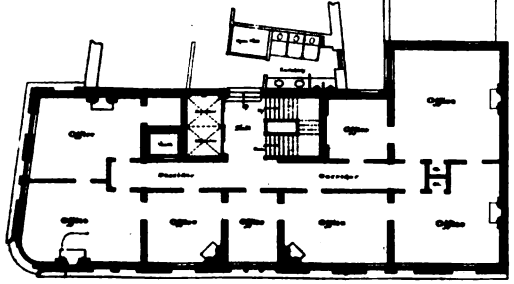
THE NILES BLOCK School St. Boston. Mass.

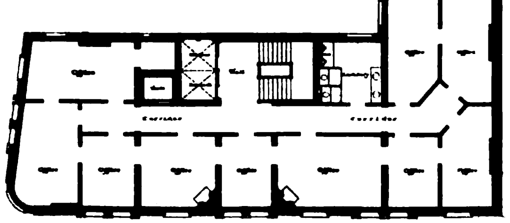
Willard M. Bacon. Archt.

E.L.D. del.

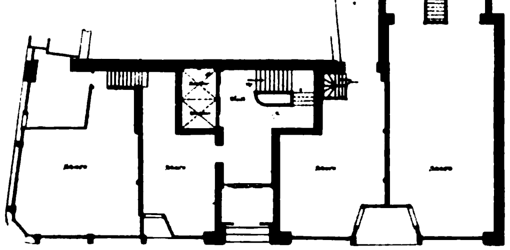
~ Third & Fourth Floor Plan ~



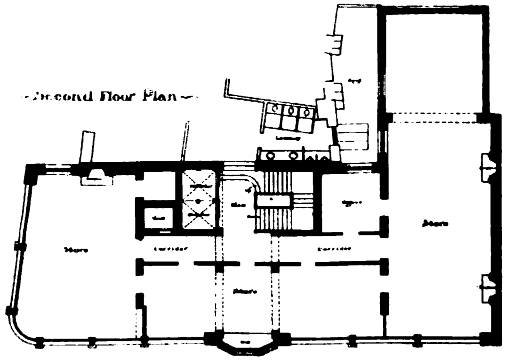
~ Fifth, Sixth & Seventh Floor Plan ~



~ First Floor Plan ~



~ Second Floor Plan ~



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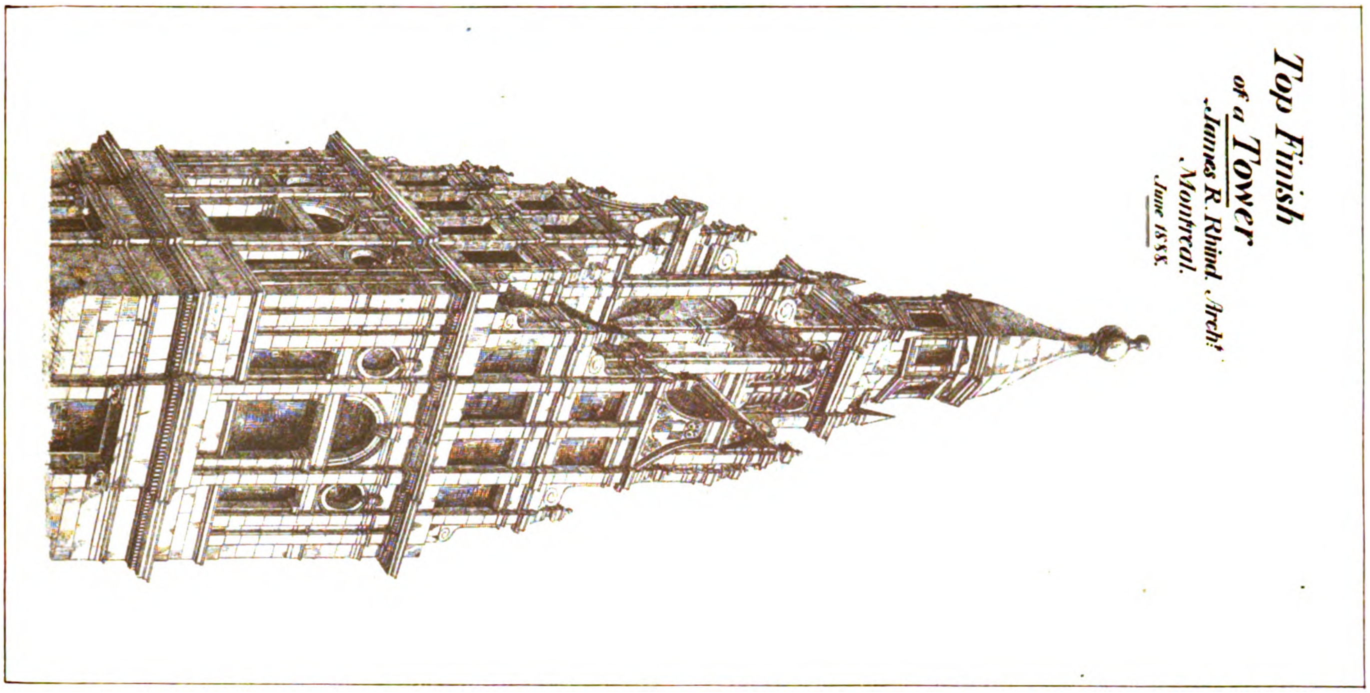

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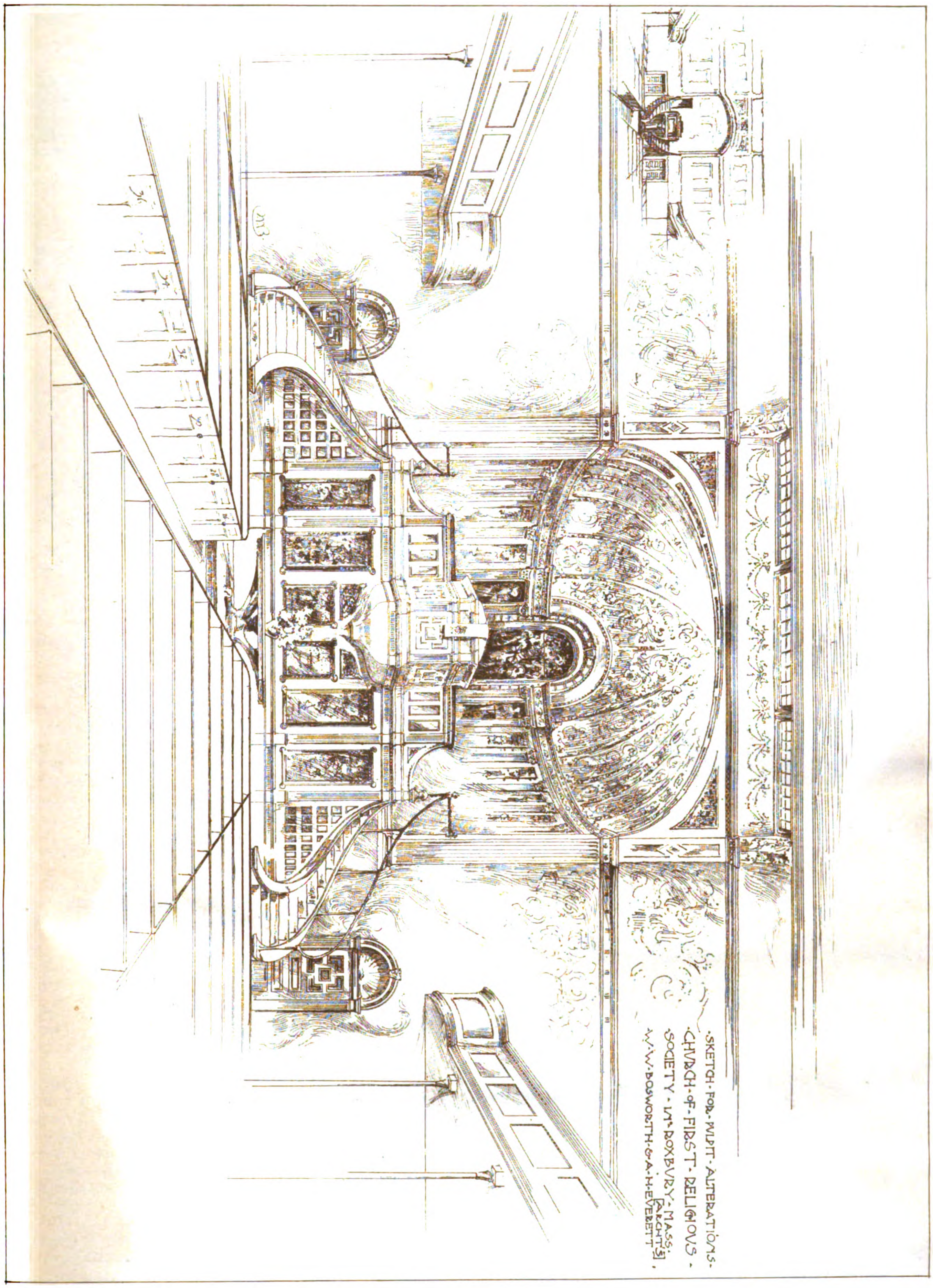

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THE AMERICAN ARCHITECT AND BUILDING NEWS.

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DECEMBER 8, 1888.

Entered at the Post-Office at Boston as second-class matter.

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THE committee in charge asks us to draw attention to the competition announced in another column for the enlargement of the State House at Boston and we comply, with regret that the Commonwealth of Massachusetts should have such good cause to be ashamed of herself.

FIRE AND WATER calls attention to the increased risk from fire attending the use of the strong shutters and solid roofs now so commonly used on warehouses. At a recent fire in Australia the firemen found the shutters so securely fastened that the inside of the building, filled with valuable goods, was nearly burned out before they could get a stream of water into it. In a similar manner, at a fire in New York a week or so ago, the firemen, knowing that they could not get into the windows, climbed to the roof, and attempted to cut a hole through. They found that the roof was laid with brick and concrete, and it took so long to make an opening in it that the stock in the building was almost destroyed, and it was finally necessary to cut through the brick party-wall from the adjoining building in order to get a hose through. As a remedy for the bad effect of fortifying buildings so successfully against friends and foes alike, *Fire and Water* proposes that the practice common in Chicago, of leaving one shutter on each story unfastened, so that it can be opened from the outside, should be adopted in all large cities.

ARCHITECTS can undoubtedly do something toward assisting the introduction of the metal aluminium into common use. The present price of aluminium is about eight dollars a pound, or about one-half that of silver by weight, while as the specific gravity of aluminium is two and one-half, while that of silver is more than ten, one can exchange a piece of silver for one of aluminium eight times as large. For many purposes this would make the cost of an article of solid aluminium no larger than that of one of brass plated with silver, while the advantage would be all on the side of the former. Many years ago drawing instruments were occasionally made of aluminium, in place of German silver; although then very costly, they were so light to use, and so strong and handsome, that those who could afford them thought their money well invested. At present prices, the use of the aluminium should add only two or three dollars to the cost of an ordinary pocket case of instruments, and the interest on this outlay would be repaid many times over by the superior delicacy which would be possible in handling the lighter tools, the avoidance of much of the risk of blotting valuable drawings by the fall of heavy dividers from the fingers, and the lessening of the fatigue from which the hands of very busy draughtsmen sometimes suffer. Opera glasses are very commonly made of aluminium at present, for lightness in use, and drawing tools, which are in the fingers all day, have quite as much claim to be made light as an object only held for a few moments in the course of an evening. Besides articles for their own professional service, architects could think of many building appliances for which a white, strong metal, not subject to corrosion, is greatly needed. To say nothing of locks, keys, bolts, hooks, chains and other items of builders' hardware, the portions of plumbing apparatus now commonly formed of brass, plated with nickel or silver, would be very advantageously replaced with aluminium. The brass used for these purposes is soft and weak, while aluminium is nearly as strong as steel, and is much better in point of permanent beauty of appearance. As every one knows, silver-plating is soft, and soon wears off by polishing, while the fumes of a match, or even long exposure to the ordinary atmosphere of dwelling-houses, turns it black. Nickel plating, while harder, does not cling so tightly as silver, and sometimes peels off, while lemon-juice, or other acids, attack it energetically. There are people enough who can pay for the best material to be had, and are willing to do so, and who dislike extremely to see the basin-cocks in their houses turning black and yellow from corrosion and wear, or the bath-tubs and sinks showing red streaks of copper through the tinning. In one of the Vanderbilt houses there is said to be a bath-tub of solid silver, and we have known an order given for a pantry-sink of German silver, so as to avoid the unpleasant effects of wear. The cost of a pantry-sink stamped out of sheet aluminium would certainly be no more than of one cast in German silver, and would probably be very much less, while an aluminium bath would be inexpensive compared with one of silver, and would be better and handsomer.

THERE are many indications that the day of huge apartment-houses has gone by in New York, and, while people who like to live in flats will probably be able for a good many years to obtain pleasant and well-planned ones at a low rent, there will be few or no new ones built. The first blow at them was given by the State law limiting the height of dwelling-houses to eighty feet. As flats on Fifth or Madison Avenue were always the most attractive, and, in so fashionable a location, must be built high, in order to gain renting space enough on a given area of land to pay interest on the investment, the passage of the law put a stop immediately to the construction of the best and most desirable houses of the sort, and compelled those who wished to build them to find cheap land for the purpose. Many of them were still built, but the character fell off, and the reputation of the old ones suffered undeservedly from the defects of the new ones. Moreover, the supply of apartments in the region above Forty-second Street ran ahead of the demand, and tenants enough to fill them could not be had at any price. Several large houses, built with borrowed money by men without means enough to carry them through a period of depression, were sold under foreclosure and rented for anything they would bring, and the competition of these brought down the income from the others. Finally, the largest enterprise of the kind in New York came to grief, and the so-called Spanish Flats, which cost more than six million dollars to build, were sold at auction not long ago, and bid in by the mortgagee. These enormous structures, which were well planned and very pleasantly situated on the Park, were begun about eight years ago by Mr. Navarro, and were intended to furnish perfect dwellings for about one hundred and thirty families. Mr. Navarro's intention was to erect the buildings in his own name, and sell the apartments absolutely to those who wished to occupy them by means of trust-deeds and perpetual leases. In this way he expected to be able to build, one by one, the eight sections into which the structure was divided, reimbursing himself so rapidly by sales that he would not be obliged to keep a very large capital invested. A Home Club was formed of persons who wished to become proprietors, and many of the apartments were sold and paid for. Unfortunately, the original estimate of the cost of the whole building, two million dollars, turned out to be entirely inadequate, and long before the rough shell of the first four sections of the building, had been completed, the money intended for it had been spent. A million was borrowed on a first mortgage to finish the building, and, this proving insufficient, six hundred thousand more were borrowed on a second mortgage. All this was used up, and still the house was unfinished. No one else would lend any more money, and the second mortgagee, fearing lest he should lose the six hundred

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thousand dollars he had already invested, advanced six hundred and fifty thousand more, and completed the building, ready for occupancy. It proved very popular, and the persons interested decided to build the second half, in the hope of making up by the profit on this for their losses on the other. This portion, including the Fifty-eighth Street sections, called the Granada, Salamanca, Valencia and Tolosa, was built in 1885, the second mortgagee, as before, advancing three hundred and fifty thousand dollars to complete it. For a time it proved profitable. The apartments rented readily, and the rents paid all expenses and interest on the mortgages. About two years ago, however, the general decline in apartment-house property affected it, and the rents failed to provide for the mortgage interest. The first mortgagees foreclosed, and, after a good deal of adjustment of claims, the whole property was recently sold to the second mortgagee. This sale cuts off all the rights of the original proprietors, who paid for their apartments as members of the Home Club, and the new owner, regardless of their certificates of perpetual tenancy, is said to be intending to compel them to pay rent, just as if they had no money invested in the buildings.

AN architect in Berlin has just received a criminal sentence on account of an error in judgment, by which the lives of workmen were lost. The architect in question, M. Hiller, had designed a hospital, with a terra-cotta cornice. The upper members of the cornice overhung considerably, and the problem of supporting it, which is always a serious one with projecting members of terra-cotta, was solved by laying an iron plate on the lower portion of the cornice, held down by bolts three feet long, placed six feet apart, near the back edge of the plate, and extending down into the backing of the cornice, which was composed of brickwork fourteen inches thick. The terra-cotta blocks for the upper portion of the cornice, which projected fifteen inches from the face of the wall, were delivered irregularly and were set in place as they arrived. Apparently, this prevented tying them properly together, for, before the cornice was finished, sixty feet of it gave way, carrying to the ground with it nine workmen, of whom eight were killed. It is hard to tell, without seeing the testimony, just how the blame was apportioned between the architect and the contractor, but both have been sentenced to six months' imprisonment.

A NEW and promising light has been invented and patented, which is likely to come into extensive use for contractors and others who have night work on their hands. The principle is something like that of the famous Lucigen, in which a jet of crude petroleum, driven in spray by compressed air, is made to give a light rivalling in intensity an electric arc-light, but steam is used instead of compressed air to drive the jet of oil spray. The apparatus, ready for use, consists of two cylinders, one containing oil and the other water. They are filled from the bottom, so that the air in the cylinders is compressed in the upper portion; or air may be forced in by a small condensing pump. When the lamp is to be used, the condensed air from the top of the cylinders is allowed to begin to escape through the jet, and the oil is then turned on. The spray of oil and air is lighted, and burns with a light equivalent to that of twenty-five hundred candles. Just above the flame is a coil of pipe, communicating with the water cylinder. As soon as this coil is hot, the water is turned on, and, passing through the hot coil, is vaporized, and enters the jet in place of the compressed air, which is then turned off. The steam serves to maintain the blast begun with compressed air, while it greatly increases the light, through its decomposition into oxygen and hydrogen, which assist the combustion of the oil. As there is no wick, no choking can take place with any kind of oil, and crude or refuse petroleum, or creosote from gas-wastes, can be burned, while the apparatus is portable, and the lamp can be lighted in a moment.

M. LAMOUROUX, a counsellor of the city of Paris, has written a curious report upon the movement of population in that city, the average rents in the various quarters, and other statistics. As the boundaries of Paris are very distinctly defined by the line of fortifications, it is particularly easy to collect reliable statistics of the kind there, and as the Parisians are never tired of studying their own town, a great deal of information is collected in that way. Two or three years ago an alarm was raised that the population of Paris was declining, and we believe that it did fall off about ten per cent within a few years. Whether this movement still continues seems to be now uncertain, but M. Lamouroux's figures certainly do not indicate that the city has begun a new career of prosperity. Although the rich foreigners flock to Paris as much as ever, the working people are deserting it, as is plainly shown by the tables of vacant tenements. In the whole city there are now eight hundred and six thousand, one hundred and eighty-seven dwellings, most of these being, of course, small suites of rooms in a large house. At the end of 1887, nearly forty-seven thousand of these, or almost six per cent, were vacant. In 1885, about thirty-three thousand were reported vacant by the police, so that the number of empty dwellings increased in two years by fourteen thousand. During 1886 and 1887 fifty-six hundred dwellings were demolished, and eighteen thousand new ones built, so that the number of dwellings added to the city in those two years was twelve thousand, four hundred; yet, if there had been no new houses built within the two years, the number of empty tenements would have been greater by about fifteen hundred in 1887 than it was in 1885. This would seem to show conclusively a diminution in population, especially as the tendency in all great cities at present is to crowd families together less, and to multiply the number of small, independent households. The official returns distinguish between dwellings renting for one hundred dollars a year or less and those which cost more, and it will probably surprise persons not familiar with the modest way in which the real Parisians live to learn that six hundred and twenty-two thousand, or more than three-fourths of the whole, belong to the former class, while it is in this class that the depopulation of the city is most marked, the number of vacant small flats having increased in two years from nineteen to thirty thousand, while the number of unoccupied tenements of more than one hundred dollars rental value increased in the same time only from fourteen to sixteen thousand.

IN connection with his report, M. Lamouroux gives a map, which *La Semaine des Constructeurs* reproduces, showing the present average rental value of a tenement in each quarter of Paris. The most expensive quarter is, as might be expected, the region along the Champs-Elysées, where the average rent of an apartment is eight hundred dollars a year. Next to this comes the Madeleine quarter, where the average between the rent of the splendid dwellings on the Boulevards and the shabby rookeries on the back streets is five hundred dollars a year; and the third is the territory about the Invalides, where the rents average about the same as in the quarter of the Madeleine. This last is the ancient aristocratic quarter of Paris, while the others are those affected by the foreign residents, and between these and the districts inhabited by the great mass of middle-class and working people there is a striking difference in rents. The cheapest place to live in all Paris is the quarter of the Maison Blanche, south of the Gobelins factory. Although this is by no means an unpleasant or inconvenient place, being almost the highest land in Paris, and connected by the Belt Railway and various omnibus and horse-car lines with the other portions of the city, the average rent of an apartment is only forty-three dollars a year, or not much more than one-twentieth the average rent in the "English quarter" around the Champs-Elysées. The next cheapest region is Charonne, near the cemetery of Père Lachaise, which is also on high ground, and affords tenements at an average price of forty-seven dollars a year. Dwellings averaging from sixty to seventy dollars a year can be had, or could be had in 1887, in the quarters of Grenelle and Necker, close to the Exposition buildings now in process of erection, and in various districts in the northeast part of the city; while for one hundred and fifty dollars a year one may have an apartment under the shadow of the Sainte Chapelle, or of the Sorbonne, or the School of Medicine, or the Polytechnic School, or the Hôtel Cluny, or the Law School, or the Hôtel de Ville, or almost any of the hospitals, according to taste. As to the style of living expected of a tenant in the various quarters, a curious indication is given in a supplementary table of statistics given by M. Lamouroux, which shows that the number of domestic servants kept varies about in proportion to the rent paid. In the district of La Maison Blanche in 1886, in one thousand households, each composed of not less than two persons, only twelve domestics were employed; while in the quarter of the Champs-Elysées, the same number of households, of the same minimum size, kept sixteen hundred and forty servants.

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BUILDERS' HARDWARE.[1] — XIV.

SASH-FASTS.

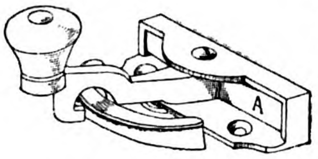

Fig. 183. Sash-fast. P. & F. Corbin.

THERE are so many varieties of sash-fasts to be considered, that, in order to make the descriptions less confusing, it will be well to classify the sash-fasts according to their most prominent characteristics.

I. *Old Style of plain lever-fast.* This consists of a plain, pivoted bar, attached to the upper sash, with a hook on the end, which works over a catch or raised plate on the lower sash. A knob, often of porcelain, is fastened to the end of the bar. Figure 183 illustrates this type. In the oldest makes of this kind, the lever was simply pivoted on the upper sash, and a knife-blade, slipped between the meeting-rails, could push the lever to one side and unlock the window without the slightest difficulty. In the sash-fast shown by the figure, the lever is made with a broad, flat end, which presses against a strong spring, *A*, at the back. The spring serves to stiffen the action of the lever, which is further protected against intrusion, in some cases, by dovetailing the bottom plates, so that the lever cannot be got at through the joint between the meeting-rails. Varieties of this same form are made with the lever swinging only half around in one direction, the gain thereby being that the back spring can be made longer and stiffer, without increasing the size of the sash-fast.

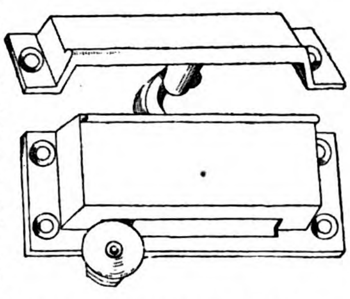

Fig. 184. Sash-fast. Russell & Erwin.

Figure 184 represents a variety of sash-fast, in which the lever is on the lower sash and hooks over an inverted peg on the upper sash. The "Judd" sash-fast, Figure 185, has a

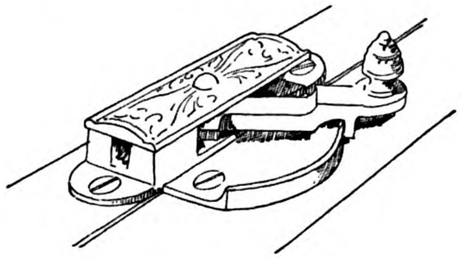

Fig. 185. Judd Sash-fast.

shoulder on the side of the lever so arranged that a knife-blade would catch on it and be broken before the lever could be moved sufficiently to open the window. Figure 186 shows a

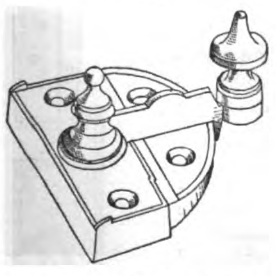

Fig. 186. Sash-fast. Norwich Lock Mfg. Co.

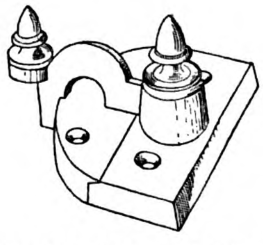

Fig. 187. Sash-fast. P. & F. Corbin.

strong form of sash-fast with no spring of any sort, but with a protection for the lever by dovetailing the plates together, as described in the previous paragraph; while the sash-fast, as indicated by Figure 187, works in exactly the same manner, but the plates are rebated together. Figure 188 is yet another variety, the plates here being not only dovetailed together, but also lipped down into the joint between the meeting-rails. The lever works in the same manner as the first sash-fast noticed.

[1] Continued from page 240, No. 674.

II. *Spring lever sash-fasts.* While some of the forms just described might be classed under this category, none of them actually have spring levers, as the springs are not so arranged as to force the lever open or shut from any position. Figure 189 shows what is known as the ordinary "Boston" sash-fast, which is used a great deal in Boston, and is much liked for its simplicity and sureness of action. This form is, apparently, made by almost every manufacturer of builders' hardware in the country. There is a coil spring around the hub of the lever tending to throw it back, and a simpler spring which bears against the ratchet connection at *A*, so as to lock the lever when it is closed. Hopkins & Dickinson manufacture a variety of this form, in which the spring-catch, *A*, has several cuts or ratchets on its edge, and the catch on the lever is bevelled, so that it will be held by any one of the ratchets. The advantage claimed for this is, that if the lever is drawn around hastily, it will be more likely to catch on the ratchets and be locked, than the ordinary pattern, which has but a single ratchet. This is known as the "Ladd" sash-fast.

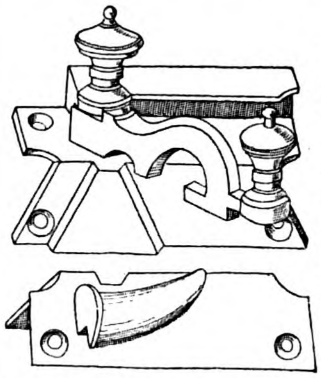

Fig. 188. Metropolitan Sash-fast. A. G. Newman.

The "Boston" sash-fast has to be set pretty carefully in order to be effective, and in the case of very excessive shrinkage, the space between the plates might be so reduced that the ratchet would not hold the lever. Such difficulties would, of course, arise only in a third-rate building. The form is believed by many of the dealers to be the best in the market, and it surely answers very fully the requirements of a perfect sash-fast.

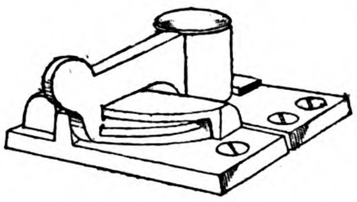

Fig. 189. Boston Pattern Sash-fast.

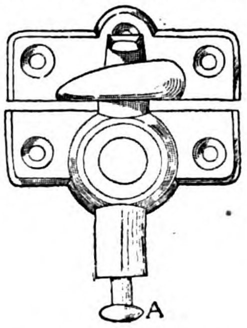

Fig. 190. Sash-fast. Hopkins & Dickinson Mfg. Co.

A scarcely less admirable sash-fast is shown by Figure 190. The lever is on the lower sash, hooking under a tooth on the upper sash, which is bevelled so as to draw the sashes more closely together. A strong spring about the axle of the lever tends to throw it open, while a small bolt, inside the lever, locks into a concealed catch on the post or axle of the lever. The bolt ends in a knob, *A*, and is fitted with a spring which keeps it pressed tightly towards the centre, so that the lever is caught and held when it is turned clear around through 90 degrees. On pulling the knob, *A*, the catch is released and the lever flies open.

Figure 191 illustrates a sash-fast which works in very nearly the same manner as the preceding, except that in order to release the lever the knob is pushed in. The Hopkins &

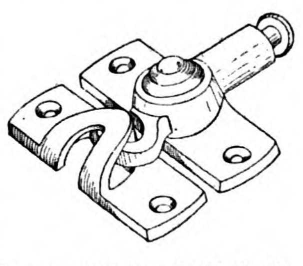

Fig. 191. Sash-fast. Stoddard Lock Co.

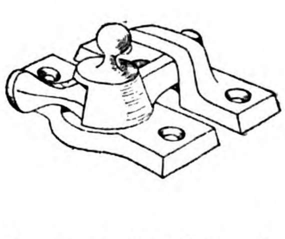

Fig. 192. Favorite Sash-fast. Reading Hardware Co.

Dickinson Manufacturing Company also has a sash-fast which hooks around a pin, like Figure 191, but is otherwise the same as Figure 190. P. & F. Corbin manufacture two forms of sash-fasts which are essentially the same as Figure 190.

III. *Lever sash-fasts with locking lever.* This includes

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those in which the lever works without a spring, but is held either closed or open by means of an auxiliary lever. Figure 192 gives one variety of this kind, the lever being pulled down in order to permit the bolt to turn. The locking lever here is held in place by a spring, and catches into a slot in the bed-plate, preventing the lever from being turned. Figure 193

Fig. 193. Sash-fast. Yale & Towne Mfg. Co.

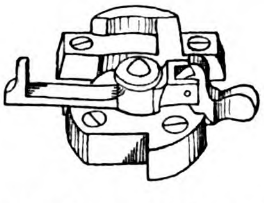


Fig. 194. Morris Sash-fast. Ireland Mfg. Co.

has a lever which works in the same manner as that of Figure 191, except that it has no spring. It is locked in place when turned, by a catch which is released by pressing the knob on top of the hub.

Figure 194 represents a form of sash-fast which has met with considerable favor, as being one of the first which had any right to the qualification of being burglar-proof. The action is perfectly simple. The lever is on the lower sash, and is held either open or shut by a smaller hinged lever which drops by gravity into the rebates of the bed-plate. Figure 195 shows a fast which operates in exactly the same manner, the

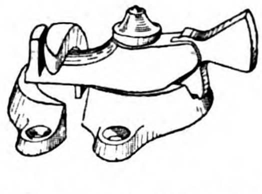


Fig. 195. Triumph Sash-fast. Ireland Mfg. Co.

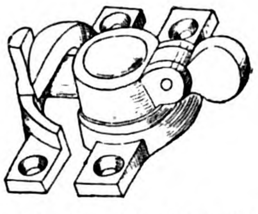
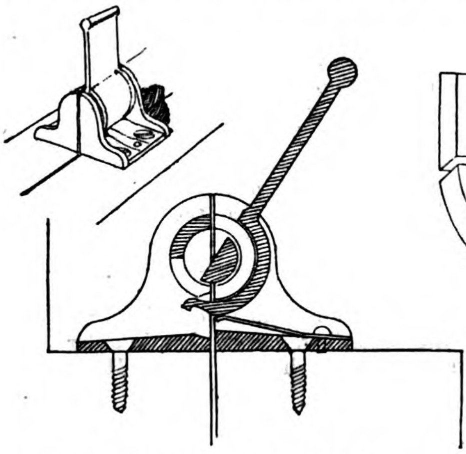


Fig. 196. Sash-fast. P. & F. Corbin.

smaller, gravity lever being raised to release the main lever; and Figure 196 is a type of a number of similar forms manufactured by P. & F. Corbin. The lever in this example is released by raising the secondary lever at the rear.

IV. *Locking lever sash fasts.* This class includes those sash-fasts in which the lever locks itself when turned. Figure 197 is a form which has been on the market for some time, and



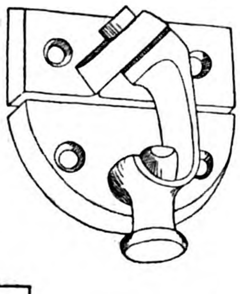


Fig. 198. Payson Sash-fast. J. B. Johnston.

Fig. 197. Mathes's Sash-fast. Nimick & Brittan.

is now comparatively little used, though the chief objection to it is only in reference to its size. It is as near to being absolutely burglar-proof as any form of sash-fast which has been devised. Half the axis, about which the lever is rotated, forms a part of the upper and of the lower sash portion of the fast. The figure shows the position when the sashes are locked, the lever hooking down under both half-axles, and not only drawing the two sashes together, but binding and holding them so they cannot be moved. To unlock the sash, the lever is thrown up to a vertical position.

The "Payson" sash-fast, Figure 198, is very simple and effective, ranking as one of the best in the market. The lever is on the top sash, and locks itself over the opposite post with the help of a small spring-bolt, the knob of which shows at the end of the lever. The attachment of the lever is such as to permit it to fold back on the upper sash. This sash-fast is not liable to get out of order, it draws the sashes together, and is as burglar-proof as would ordinarily be desirable. The only objection to it is that the connection between the lever and the locking-post does not allow for much shrinkage in the sash.

V. "*Cam*" *sash-fasts.* The sash-fasts of which Figure 199 is a type, are quite difficult to represent by a drawing. The action of the fast is as follows: The levers are fastened to the lower sash. When the upper lever is turned, the lower, or locking lever, is first thrown out until released from the hook on the upper sash, and then drawn around and in toward the hub, until both levers are on a line with the edge of the sash, the upper lever moving through 180 degrees, while the lower lever is moved only 90 degrees. Though the action sounds complicated, the sash-fast is perfectly simple in its construction, and there is nothing about it that can get out of order, or even wear loose, except by such excessive use as would practically never be given it in a house. There are no springs about it, consequently it has no automatic action, and in unlocking, care must be taken that the locking lever is turned clear around, as otherwise it will project beyond the meeting-rail and catch on the sash-muntins. This is really the only objection to it.

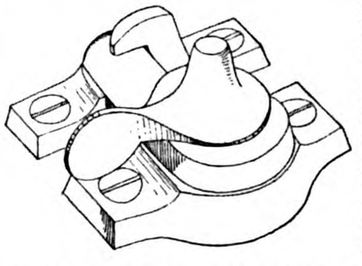


Fig. 199. Ives Sash-fast. H. B. Ives & Co.

Figure 200 is a very similar sash-fast manufactured by P. & F. Corbin. It differs only in the internal, eccentric arrangement. The Reading Hardware Company also manufactures a sash-fast very much like the "Ives."

VI. *Self-locking sash-fasts.* The "Boston" sash-fast flies open of itself, unless properly locked. Many people believe that a sash-fast should lock itself the moment the sash is drawn down, so as to leave no chances of the windows being unlocked, and, accordingly, there are in the market several varieties of self-closing sash-fasts. For general house use, it is believed, that such fasts would prove a great nuisance, as the window would, of course, have to be unlocked every time it was to be opened; besides, nearly all of these self-locking appliances are much more liable to get out of order, either through rust or neglect, than the ordinary sash-fasts; still, in some cases, there seems to be a necessity for them.

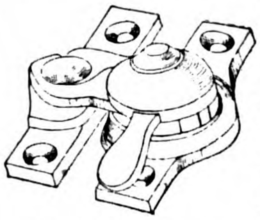


Fig. 200. Sash-fast. P. & F. Corbin.

Perhaps the simplest form of self-acting sash-fast is that illustrated by Figure 201. This consists of a spring bolt, acting not unlike the latch-bolt of an ordinary lock, which flies out whenever the sash is closed. It is mortised into one of the styles of the upper sash, or into the hanging-style, and the bolt bears on a plate on top of the meeting-rail of the lower sash. The figure shows one of the case-plates removed, to illustrate the construction. A very similar fast is shown by Figure 202. This, however, is not self-locking, as the top of the lever must be pressed in to force out the lower portion. Both of these appliances might almost be classed as sash-locks, instead of sash-fasts.

A self-locking fast of the description of Figure 201 has the disadvantage that the bolt must be held back when the window is to be raised, and, if the sash should bind, it is rather awkward to attempt to hold back the bolt with one hand and move the sash with the other. There is a device, the Security Self-locking Sash-fast, which obviates this difficulty, this consists of a bolt similar to that of Figure 201, but with a locking-lever which falls out when the bolt is pushed back. This holds the bolt flush with the sash and allows the sashes to be raised or lowered, but when the meeting-rails pass each other, the locking-lever is raised, releasing the bolt, which flies out as soon as the window is closed, thus locking the sashes.

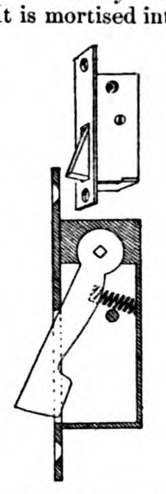


Fig. 201. Ticket-office Sash-lock. Enoch Robinson.

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Figure 203 is a self-locking sash-fast on a different principle. The cut shows the lower sash partly raised, the locking portion being attached to the upper sash. When the window is closed the hook, *D*, strikes against the catch, *C*, forcing it away from *B*, until, when the meeting-rails are on a level, *D* is hooked in between *C* and *B*. A spring at *A* keeps the two parts pressed against each other.

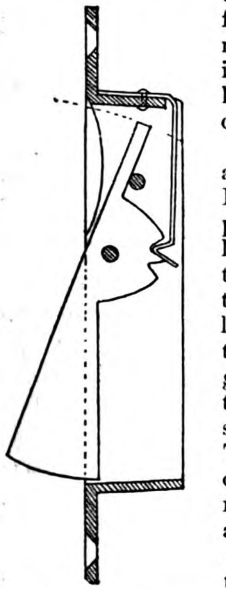

Fig. 202. Sash-fast. E. Robinson.

A very ingenious sash-fast, which works almost entirely by gravity, is shown by Figure 204. The cut shows it in the position it takes when the window is locked. The mechanism is attached to the upper sash. *A* is hung on each side to *B*, which hooks over the post on the lower sash. To open the window, the thumb is placed under *B* and the forefinger on top of *A*. Both pieces are lifted together until *B* assumes a vertical position, and *A* catches over the hook *C*. The sash can then be opened freely. On closing the window, however, the lower rail strikes against a hidden lever or cam at the back of *A*, lifting it from its hold on *C*, so the piece *B* can descend to hook in the position shown by the figure. The only spring used is one which pushes out *B* when *A* is released. This sash-fast is very nicely made, and is about as good a self-locking form as is in the market. It has an added advantage in that it locks itself before the sash is entirely closed, the post, *C*, being double notched on the face so that *A* will slip down and

Fig. 203. Shaw's Sash-fast. Nichols & Bellamy Agents.

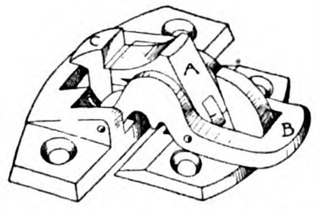

Fig. 204. Davis Sash-fast. Sise, Gibson & Co.

wedge the hook *B* when the window is within about a quarter of an inch of being closed. It will be observed that the locking is effected entirely by the piece *A*. *B* is brought over the

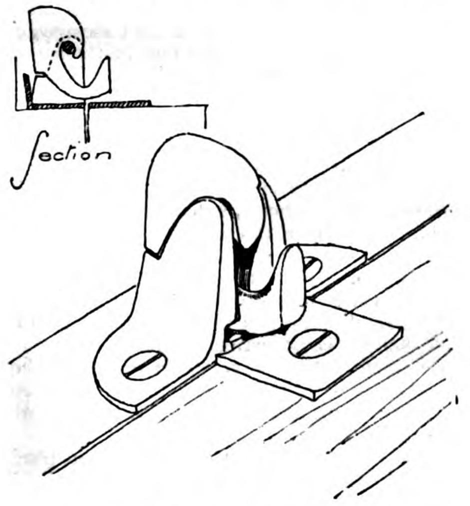

Fig. 205. Byam's Sash-fast. Byam, Stewart & Baker.

hook on the lower sash merely in order to draw the meeting-rails more closely together.

The "Byam" sash-fast, Figure 205, is a very simple device acting entirely by gravity, the central bent lever being so counterbalanced that the lower arm will always project over the lower sash. The section will show how this lever is hung.

VII. ***Sash-fasts which lock in different positions.*** The difficulty with all sash-fasts of this description is that, of necessity, they operate on one side of the window, instead of in the centre of the meeting-rail, and that, consequently, every attempt to open the window when it is locked, wrenches the sash so as to, in time, make it loose in the joints. Also, with nearly all the forms, the mechanism is concealed, so that the sashes are liable to many unnecessary wrenches. The advantages are that the window can be left partly open and still be secured from intrusion, and that, in most cases, either sash can be locked independently of the other.

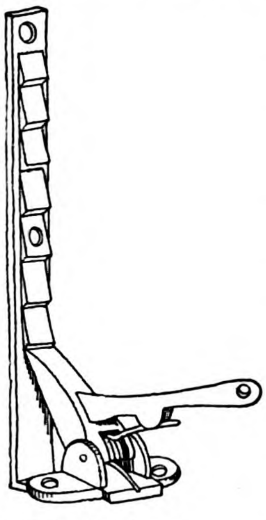

Fig. 206. Sash-fastening. J. B. Shannon & Sons.

Figure 206 illustrates a very primitive appliance, consisting simply of a ratchet rail, with a spring-catch on the bottom sash. Figure 207 shows a more complete form, which is mortised into the face of the hanging-style, the levers working into holes in each sash. The sashes are fitted with other holes on the edges, at intervals, so that they can be locked at various heights. In the cut the section shows more clearly the working. A single spring, coiled about each lever, serves to throw them

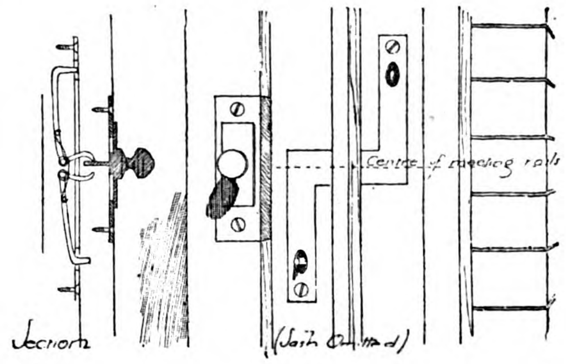

Fig. 207. Timby Sash-fast. Jenkins & Timby.

both out. Pushing up the knob on the inside bead draws back the upper lever, releasing the upper sash. Pushing the knob down releases in the same manner the lower sash.

Figure 208 represents the Attwell sash-fast, which differs

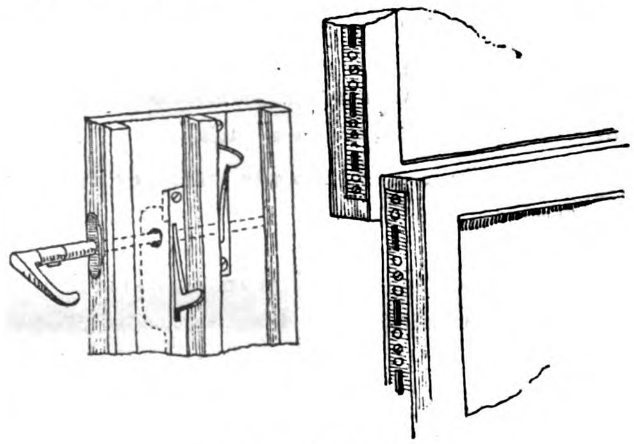

Fig. 208. Atwell Sash-fast.

from the foregoing chiefly in that the levers are worked by a single spindle, coming through the window-frame onto the face of the finish, and so arranged that when the spindle crank is turned up, the upper lever is drawn back without moving the lower, and *vice versa*.

There are a few forms of sash-fasts which will hold the window in any position. Figure 209 is a very common form, consisting of an excentric cam which screws to the face of the sash and wedges against the stop-bead, holding the sash by friction.

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Figure 210 and Figure 211 are used chiefly for car work, the former acting in the same manner as Figure 209, while the latter works into slots in the jamb.

The sash-fasts thus far considered include all the principal forms commonly known to the hardware trade, as well as types

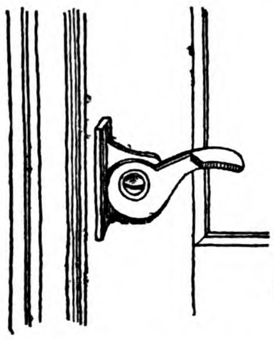


Fig. 209. Brown's Window-lock. S. A. Brown.

Fig. 210. Eccentric Sash-fast.

Fig. 211. Sash-lock.

of many styles which have only limited sales. It would be impracticable to attempt an enumeration of all the sash-fasts which have been put on the market throughout the country, nor would any such list be of great value. The forms discussed and illustrated, will, it is believed, serve every purpose of comparison, and will enable the retail buyer to select to advantage, and to know the worth of what he is choosing from.

[To be continued.]

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

HOUSES OF DR. J. J. MINOT AND DR. RUSSELL STURGIS, MARLBOROUGH STREET, BOSTON, MASS. MESSRS. STURGIS & BRIGHAM, ARCHITECTS, BOSTON, MASS.

[Gelatine print, issued only with the Imperial Edition.]

ADMINISTRATION BUILDING OF THE SOLWAY PROCESS CO., SYRACUSE, N. Y. MR. DOUGLAS SMYTH, ARCHITECT, NEW YORK, N. Y.

THIS building is almost completed; it is 44' x 114' and cost about $30,000. It is an administration building for a large concern manufacturing soda ash and includes offices, laboratories, draughting and photographing rooms. It is built of native or local buff brick, limestone and Perth Amboy terra-cotta.

THE PROPOSED NORTH RIVER BRIDGE. DESIGNED BY MR. GUSTAV LINDENTHAL, ENGINEER, PITTSBURGH, PA.

For description see article elsewhere in this issue.

LEICESTER SQUARE, LONDON, AND THE STATUE OF GEORGE I.

This illustration is reproduced from Thornbury and Welford's "*Old and New London.*"

THE STATUE OF GEORGE I IN ITS LAST STATE.

This illustration is reproduced from the *London Illustrated News.*

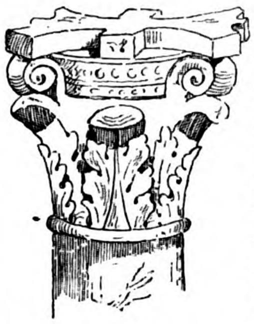
HOUSE OF JAMES F. BOYD, ESQ., ALBANY, N. Y. MR. W. H. MILLER, ARCHITECT, ITHACA, N. Y.

DINING-ROOM IN HOUSE OF H. MUNNIKHUYSEN, ESQ., BALTIMORE, MD. MR. C. E. CASSELL, ARCHITECT, BALTIMORE, MD.

DR. WEBB'S OFFICE, SHELBURNE, VT. MR. R. H. ROBERTSON, ARCHITECT, NEW YORK, N. Y.

In demolishing an old building in Stockton for the purpose of erecting a new one it was found that the foundation rested upon the hull of a vessel, which, upon investigation, proved to be the Peruvian brigantine "*Adelaide,*" 300 tons burden. She was anchored at her present resting place in 1850, and now lies several blocks from the water. — *San Francisco Call.*

THE PROPOSED NORTH RIVER BRIDGE AT NEW YORK CITY.



IT is presumed, that every one is aware of the present antiquated manner of landing passengers in New York City, from any of the railroads now terminating on the New Jersey side of the Hudson or North Rivers. There is annoyance, and even danger, to the landed passengers on the overcrowded and nasty streets, and the demand for better facilities has repeatedly and urgently been made.

It has led to the attempt of tunnelling underneath the river, but the difficulties were found to be great, and it is obvious that two tunnels, such as proposed, would not accommodate more than, perhaps, one railroad. It is estimated that, at least, ten tunnels would be needed to meet the present demand alone, to say nothing of the future growth of the traffic. The reason for it is that the trains through such tunnels would necessarily have to be short, and have to run slowly for the sake of safety, because heavy grades are unavoidable to reach the safe depth under the bottom of the river.

The tunnels would, however, be very convenient for the local traffic, by means of cable cars, between Jersey City and lower New York City. The obstacles to the construction of a bridge across the North River seemed insurmountable. The only kind of a bridge thought of was one with piers in the river. The foundations to rock would be very deep, nearly 200 feet, but the greatest objection was that such piers would greatly damage the large, and steadily increasing commerce over the most magnificient river highway in the United States.

It is true that some fifty or sixty years ago an enterprising and remarkably ingenious builder proposed a wooden bridge in one span over the North River; but this project, described in quaint verse, is more remarkable for boldness of thought than for practicability.

The first one to propose to bridge the North River, at New York City, in one single span, and to present fully worked-out plans, is Mr. Gustav Lindenthal, Bridge-Engineer, in Pittsburgh, Pa. He addressed the American Society of Civil Engineers, last winter, in a paper on the subject, and showed on that occasion how he had arrived at his design by the process of selection and exclusion from a number of designs made for the purpose. Together, with a description of the details of the colossal structure, he presented a discussion of long-span bridge systems in general, from which it appeared that the so popularly assumed merits of cantilever bridges for long-spans are more than doubtful, and that they are certain of being superseded by better and stronger construction, as soon as their grave faults become more generally understood.

The matter of realizing Mr. Lindenthal's plans has since been taken in hand by a number of prominent capitalists, who have applied to Congress for the required legislation, and who hold out every promise of building the great bridge and the necessary approaches, together with the terminal stations at both ends, so that all railroads may use it on equal terms.

The importance of this enterprise, its benefits and far-reaching consequences to the city of New York and vicinity, can hardly be over-estimated.

The bridge is designed for six tracks, but will be built to carry four additional tracks, or, ten in all, should it become necessary.

Another bridge over the North River, at New York, should never become necessary, and should never be built. Only a fraction of the combined capital required for a number of double-track bridges will build a single structure, stronger and more enduring for the same number of tracks. For instance, a double-track bridge in one single span, over the North River, is estimated to cost $9,000,000 for construction alone, while a bridge, capable of carrying six tracks, is estimated to cost $15,000,000; and one million dollars additional will provide for four more tracks or in all, ten tracks, on the same structure. Five single bridges for double tracks would therefore cost about $45,000,000 for construction alone, without the approaches, stations, and without right-of-way. This will show the economy as well as the necessity of providing one bridge large enough for all present and future needs, and one station for all the western roads, coming into New York.

The number of trains which can be run on ten tracks onto Manhattan Island will be about the limit for which terminal facilities can yet be provided, without absolutely destroying the most valuable business quarters in New York City.

Careful investigation and estimates show, that a bridge of the same strength and capacity and for the same trackage, but with a pier in the middle of the river would cost not less, on the contrary slightly more, than a single span-bridge. This is principally on account of the great depth to rock for such a pier, which has to be of a certain size for a safe bridge intended for fast trains.

Therefore the obstruction of the river with a pier could not be justified even on the ground of the smaller cost of such a bridge.

The construction of the proposed bridge, gigantic and unprece-

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dented as are its proportions, is considered by all competent engineers a matter of much less relative difficulty than was the construction, at the time, of either the East River Bridge or of the St. Louis Bridge. In such a degree have the manufacturing and constructive facilities of the country improved and increased, that the cost of the proposed bridge will be only little more than one-half of what it would have cost twelve years ago.

Mr. Lindenthal's plans are worked-out not only for the bridge, but also for the approaches and terminal stations at both ends, without which the bridge would be of no use.

The large passenger station, in New York City, to be located in the most central part of it, is for two decks, a commodating together thirty tracks, 1,000 feet long. This arrangement has been chosen on account of the very costly right-of-way, which makes it advisable to use height, rather than width for obtaining the required room. The track-platforms will be reached by stairways and numerous elevators at about the same height as the present elevated-railroad stations.

The approaches will be on iron viaducts of the most solid construction, with buckle-plate floors and stone ballast, and partly they will be (for the portion next to the station) on stone arch-viaducts, similarly to those for the East River Bridge. On the New Jersey side, the approach will begin from the meadows between the Hackensack River and Bergen Hill. This latter ridge will be crossed in an open cut, ninety feet wide. The stone quarried out of this cut will not be sufficient by one-half to furnish the concrete material for the tower foundations and anchorages, which are both to be faced with granite masonry.

It will be seen, then, that there is other large work to be done besides building the bridge, and an idea of the cost can be obtained from the following estimate:

The North River Bridge including the anchorages 6500 feet long.	$15,000,000
The approaches of stone and iron and the connecting railroad switch-yards, engine-houses, the grand Terminal Station Building and appurtenances.	11,000,000
Right-of-way, interest during construction and incidentals.	14,000,000
Total cost.	$40,000,000

Great as is this cost, it is fully justified by the traffic in sight, without increase of the present rates. But the undertaking is feasible only when all the railroads can cross over; for not one of them, even the great Pennsylvania Railroad, could build the bridge and terminal improvements single-handed, because for the financial burden assumed, itwould certainly, by law, be obliged to let the other railroads cross over on the same terms.

There are nearly 900 trains arriving and departing every day from the terminal stations in New Jersey, opposite New York City, with nearly 50,000 passengers.

This travel is growing all the time, and by the time the bridge will be finished (say ten years) the traffic will have doubled in anticipation of its completion.

The experience with the Broad Street Station of the Pennsylvania Railroad in Philadelphia, with the Brooklyn Bridge, with the elevated railroads in New York, with all of them, was that the most liberal estimates of probable traffic were largely exceeded, and that it keeps growing steadily to unforeseen proportions.

This points out the necessity of providing on the largest scale attainable, in the plans for the bridge and the terminal station, for a traffic, than which a larger and more important will not be in any part of the Old or New World.

No other engineering project was ever proposed of such great merit at its inception, and so carefully studied in its preliminary stage, nor of so great and pressing necessity.

Mere figures would not give an adequate impression of the gigantic work, but some idea of it can be obtained from a comparison with the great East River Bridge, as will be seen from the following data:

	Brooklyn Bridge.	North River Bridge.
Length including anchorages.	3700 ft.	6500 ft.
Height of anchorages.	85 ft.	210 ft.
Weight of each anchorage.	60,000 tons.	660,000 tons.
Length of each land span.	930 ft.	1500 ft.
Length of middle span.	1600 ft.	2850 ft.
Size of towers at high-water mark.	140 ft. x 59 ft.	340 ft. x 180 ft.
Height of towers from high water.	272 ft.	500 ft.
Height of tower from the deepest foundation to top.	350 ft.	690 ft.
Width of bridge.	85 ft.	86 ft.
Height above high water.	135 ft.	155 ft.
Number of cables.	4	4
Length of one cable.	3580 ft.	6100 ft.
Finished diameter of cable.	15½ in.	48 in.
Number of railroad tracks.	two.	six to ten.
Grade on bridge.	3¼ per cent.	1 5-10 per cent.
Weight of iron and steel in the structure.	6750 tons.	42,000 tons.
Allowable speed of trains.	10 miles per hour.	30 miles per hour.
Cost from anchorage to anchorage exclusive of land damages.	$5,600,000	$15,000,000

The North River Bridge will differ from the East River Bridge also in the character of its details.

Thus the anchorages will be accessible in every part through commodious passages and chambers in the interior of the huge anchorage mass. In the East River Bridge the anchors and chains are buried in the masonry, as it was not thought necessary to make them accessible.

The towers of the North River Bridge will be built of steel, forming two half-towers with eight columns each, and strongly braced together to resist the action of tornadoes, which would not affect the structure any more than it would a solid mountain.

The columns will be seven feet in diameter at bottom, and taper to five feet diameter on top. The towers can be erected without false-works. But the greatest difference will be in the arrangement and construction of the cables.

Thus, in the East River Bridge, the cables are placed side by side a certain distance apart, and the required rigidity for the roadway is obtained through six stiffening trusses, also placed side by side.

In the North River Bridge, the cables are placed in pairs above each other fifty feet apart, with the bracing between them, so that they form two arched girders of huge proportions, which are capable of giving very great rigidity to the roadway without the aid of stiffening trusses, and with a great saving of material and weight. But, as an additional precaution for the great concentrated loads of heavy locomotives, there is under each of these arch-girders a stiffening truss, two in all, which, will also aid in resisting the effect of tornadoes, in combination with the wind-cables: these are four in number, placed on top and below these stiffening girders; each wind-cable has a diameter of sixteen inches, or larger than the diameter of the East River main cables.

In this way the required rigidity for fast trains is obtained with the least possible weight of the suspended structure. In no other way can it be obtained with an equal economy of material and cost. It will be admitted that a bridge over which trains would have to run slowly would be inadequate for the expected traffic, and would be behind the age. The regular working speed over the bridge is to be thirty miles per hour, a speed which never could safely — be attempted on a long submarine-tunnel, built through mud and sand.

While in the Brooklyn Bridge the cables are compacted and closely wrapped with wire into a solid cylindrical shape, in the North River Bridge the cables will be also compacted into a cylindrical shape, but will be covered with a solid sheet-mantle or steel envelope, leaving an air-space of two inches all around the wires for the double purpose of protecting the cables against uneven temperature effects and against the weather. The water will be more thoroughly and certainly excluded by the solid sheet covering than can be the case with wire-wrapping only. The steel-envelopes can be removed for the inspection of the cables, whenever needed. The preservation of the cable is thereby made easier, inasmuch as linseed oil can be applied readily whenever needed, and the wires thoroughly soaked with oil, thus preventing rusting.

The architectural features of the bridge are striking and well considered. The graceful curves of the cables, the simple and strong form of the well-proportioned double-towers, the large-featured architecture of the anchorages, all combine to make the structure grand and harmonious in all its parts without artificial devices or ornamentation.

There is no other known place in the world requiring such a long span-bridge, and it is very probable that a longer span will never be proposed or designed anywhere. The much-talked-of bridge over the English Channel would be 20 miles long and 180 feet high, but the longest spans proposed for it do not exceed 1,800 feet. It is the length of span, and not of the bridge, which taxes the ingenuity of man and the resources of science; for the longest bridge in the world does already exist in the city of New York in its elevated railroad, 33 miles long, as one continuous bridge. But no one would assume that as the greatest achievement in bridge-engineering.

Thus the time has arrived when the manufacturing facilities of the country, its financial prosperity, and the resources of science combine to make the construction of this great work possible, to the certain success of which commercially, as well as from an engineering point of view, we may look with great confidence.

IMPROPER COMMISSIONS.

November 12, 1888.

My Dear Sir, — We have frequently paid brokerage to individual architects of more than $25.00 in a single month. It won't take a minute to read our terms.

To architects who send us orders for Sanitary Parchment Sheathing, to be delivered direct to a builder (who is not a dealer in sheathing) we give five per cent brokerage, on each order, to the architect.

To architects who send us orders for Sanitary Parchment Sheathing, to be shipped by us to dealers or jobbers in sheathing, and to whom we are not already selling, we pay a brokerage of three per cent to the architect on all the dealer buys from us for one (1) year, including the first sale.

Large dealers frequently buy of us several thousand dollars worth of Parchment Sheathing in a single year.

Our trade prices are printed in large bold type on all our samples. The architect's brokerage for his services, does not raise or lower this printed trade price.

Notice. No brokerage paid to any one except he be an architect.

Our Parchment recommends itself; it is the best sheathing made.

It grows hard and metal-like with age.

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It has nail guide lines on its surface to direct carpenters in following the course of beams and timbers to aid them in laying the sheathing uniform and straight. No other sheathing has nail guide lines on.

Yours, etc., M—— P—— AND M—— PAPER WORKS.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

PHILADELPHIA, PA., November 15, 1888.

Dear Sirs, — I am in receipt of the enclosed this A. M. I consider it a burning shame that we should be compelled to submit to this sort of a thing. The time has come when I, for one, abstain from specifying any certain brands or makes of goods, as far as possible, because of the charge that is likely to be made, that there is a money interest in it. Circulars of this kind fall into other hands.

Statements such as are contained in the first paragraph create the impression that the acceptance of commission, or brokerage, is the usual thing, thereby casting a slur upon the whole profession. There is not an architect in this country worthy of the name who would accept any remuneration from any other than his client, who expects him to secure for him the best materials possible, and supposes the commission he pays him sufficient to enable his architect to decide upon that which is best, uninfluenced by any other considerations. Respectfully, ISAAC PURSELL.

PHILADELPHIA, PA., November 15, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs, — The inclosed has just come to hand. Perhaps you would like to give the parties a little free advertising with comments. It is about as plainly worded as any circular of the kind that I have seen. Very truly yours, GEORGE C. MASON, JR.

PHILADELPHIA, PA., November 15, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs, — I received the inclosed circular to-day and intended to return it with a few *remarks* but, upon a second thought, concluded to send it to you. I think such things should be made odious as soon as possible. Yours truly, WILLIS G. HALE, *Architect.*

PHILADELPHIA, PA., November 20, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs, — We submit the inclosed circular for your kind consideration. It seems remarkable to us that the dishonorable practice of "Architects' commissions" should be advanced in such a way as this. Subject to your good judgment, we would suggest that you comment editorially upon this matter.

Yours very truly, SMITH & PRICHETT.

WE think it likely that the persons who were indiscreet enough to put their names to the foregoing circular, have credulity robust enough to believe that all of the copies which have not found their way to our office table must have been preserved by architects who are willing to become their pensioners at $25.00 per month, and that consequently their "enterprise" is to be rewarded by a large demand for their goods.

The waste-basket, however, should not be left out of their calculations.

If these people in course of time find themselves nearing bankruptcy and not wealth, we believe that they will be able to trace their disaster to the issuing of this circular, the effect of which must be, and inevitably will be, to cause the entire building community to avoid the material thus advertised. "Good wine needs no bush" and it must be a poor thing, indeed, that cannot find a market except through underhand and disgraceful methods.

The statement made by Mr. Pursell, in the note accompanying one of the many copies of this circular which indignant architects have sent us, that it is becoming his practice to avoid calling for specific articles in his specifications in order that he may avoid even the shadow of a suspicion on his professional good name, shows clearly how manufacturers who believe in the "brokerage" of architects are bringing about a rupture of the relations which should exist between the makers of building supplies and the men who, through their control of so vast an amount of building operations, can increase or diminish their consumption.

Although we emphatically feel that Mr. Pursell's attitude is not the right one — since it may prejudicially affect the interests of his clients — we cannot wonder that he and many others have been forced into it by the actions of dealers and manufacturers. It is one of the few means of defence that an architect has against the common innuendo that he takes a "commission" from the dealers whose goods are mentioned in his specifications, to be able to say that he "never calls for a definite make or brand." An architect who calls for a lock or a window-fixture, a water-closet or an elevator in a generic way, or with simply a stipulation that the cost shall not exceed a given sum, might properly be classed with a physician who should add to the recipe just written for a patient, the recommendation that, if the druggist do not happen to have in stock the drug called for, he may "use any other equally good provided the price does not exceed —— cents per dozen."

On the contrary, that architect does his fullest duty to his client whose specification contains most precise and definite instructions as to brands, makes, styles and qualities of all the materials that are to enter into the construction of the building, and the inclusion of such directions will be understood by honest men to mean, not that the architect will receive "a commission" on the articles enumerated but that he is giving his client the full benefit of his special knowledge — and the possession of such special knowledge is one of the things that make it worth while to employ an architect rather than to undertake to get along without him.

Some architects abstain from mentioning special goods, because they do not feel sure that some of the latest inventions, which they have not yet had time to investigate, are not the best to use; but it is better to call for a fixture that will surely perform the required service, even if a little old fashioned, than to leave it to the selection of a builder whose chief aim may be immediate gain rather than lasting good repute.

Boycotting, even in the mild and negative form adopted by those who feel with Mr. Pursell, is to be deprecated, and architects should still use in the fullest degree their special knowledge of building matters in the true interest of their clients, even if they are so unlucky as to have clients who can be brought to believe that the written evidence of care and thought contained in a thorough and complete specification is merely proof of fraud being perpetrated upon themselves.

In refreshing contrast to the course adopted by those who feel that architects possess but little moral balance is that pursued by such men as Mr. Merchant, of Philadelphia, who has been known to travel forty miles or so to make a contractor apologize, on the works, for the statement that Merchant had paid the architect a commission in order to secure the introduction of his goods.

EQUESTRIAN MONUMENTS.[1] — XI.

LEADEN STATUES, DESTROYED.

A Crockery Statuette of Boy and Pony. By a follower of Palissy.

THE most commonly used material from which to make equestrian statues was bronze, at once the most imperishable and capable of taking on only less of delicacy than the most perfect of fine-grained statuary marble, which was used next in the order of frequency. Other materials have also been used, iron once or twice, wood occasionally, brass also, but more often than these lead, which, from its cheapness, low degree of fusibility and ease of working was, at one time, a favorite medium. Naturally, this material was most often employed by the least artistic and most mercantile of nations — the English, who, however, although they appreciated the economy with which they could satisfy the fashionable cravings for artistic surroundings, which were imported by returned travellers who had made the tour of the Continent, yet were themselves obliged to lean upon the greater skill of foreign artists whom chance had brought into the kingdom. After the Restoration, and in the early days of the Hanoverian House, the impulse given to art by those who, during the Commonwealth, had sojourned in France or who had followed in the train of the imported German court, was not inconsiderable, and it was more possible to meet its demands by entrusting the work to those already skilled, than to try to discover and foster native talent. But, as these would-be patrons of art were English, the desire of obtaining the most show for the least money was omnipotent, the virtues of lead were appreciated as never before, and an "art industry" of no small dimensions sprang up to meet the demand. At one time, there were in Piccadilly, several shops — hardly to be called either studios or *ateliers* — employing many hands in the production of leaden statuary, which was either made to order for, or purchased ready-made by, the wealthy nobles for the adornment of their country seats and parks, or for setting up in the public places of large cities.

Chief amongst these workers in lead were Van Ost (or Nost), probably a Dutchman, and his pupil Charpentière, who had probably practised their art in Holland, where every householder's ambition was to have his yard or garden a perfect curiosity-shop of ingenuity and misapplied art, — where a painted wooden or leaden statue in the midst of a bit of shrubbery was almost a matter of course. The leading patron of these men were James Brydges, who, like the great Marlborough, made his fortune during the wars of Queen Anne by the peculiar ingenuity with which he handled, for his own benefit, the money which, as paymaster of the troops, he was supposed to dispense for the pay and maintenance of those who bore arms. Created Duke of Chandos, Brydges set about spending with a most lavish hand the wealth he had secured, and as a first step set about building a mansion suited to his present magnificence — not only one house but two, a town-house in Cavendish Square, and a country-seat at Edgeware, three miles or so distant. To this last was given the name of Canons, and the architect, James Gibbs, and his assistants made of it, between 1715 and the death of the Duke in 1744, a very successful palace, in the Classic style adopted by Palladio. It was the

[1]Continued from page 244, No. 672.

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ambition of the owner to acquire all the land lying between his town-house and Canons, and in pursuit of this vast sums were expended, all to satisfy the Duke's ambition to be able to say that when he went down from London to his country-seat he rode only through his own estate. Not only was the palace magnificent, but the surrounding park was laid out in conformity with the best advice of trained landscape-gardeners, and here, as well as about and in the buildings, statuary was introduced without stint. Most of these statues were presumably of lead, and the work of Van Ost and his followers. Amongst these statues was a gilded leaden equestrian statue of George I, the horse modelled on that by Le Sueur for the statue of Charles I, at Charing Cross, and the King arrayed in Classic drapery. This statue was thought by Henry, second Duke of Chandos, good enough, when Canons was dismantled about 1747, to be brought to London and set up in Leicester Square, in November, 1748, where, owing to an uncertainty as to the ownership of the Square and its surroundings, it, together with the buildings, fell during the prolonged litigation into decrepitude and decay. From a fashionable quarter the Square passed through the phases of shabby gentility to something worse, and each succeeding stratum of society treated the leaden effigy with less of respect than did its predecessors. It was, apparently, no one's business to see that the King and his steed had an occasional coat of gilding, or even paint, though in 1812 it was regilded. Long years of exposure had their natural effect and persistent oxidation caused the group to gradually drop to pieces — now and then propped up temporarily by some more careful hand which, like enough, may have been raised to drive away the obnoxious small-boy of the neighborhood, who had at length so far mastered the traditional veneration for royalty as to consider the august alien as a mere cockshy, and with stick and stone and broken bottle helped on the work of time. At length George dismounted with little of royal grace, one leg falling to one side, the other on the opposite, and for a time lay beneath the belly of his horse, till at length his carcass was probably sold for old junk. For a time the riderless steed, broken-kneed and foundered, stood alone, a decrepit and meaningless wreck, which was at length concealed from view by a great model of the globe which was built about it, and covered it from sight between 1851 and 1861. In 1865 the Metropolitan Board of Works assumed possession of the Square, and finally, in 1874, Baron Albert Grant bought the place, rejuvenated it entirely, and deeded it afresh to the Board of Public Works as a public pleasure-ground for the people. During these changes the last relics of the monument disappeared.

Too late to make use of it, a photograph of the statue has been found which shows the horse spotted with paint by some local genius after the manner of the rocking-horses of our nursery days, while George, *sans* feet and legs, is crowned with a fool's cap and armed with a broom in place of sceptre, and an attempt has been made to revive the memory of the regal character of the group by binding upon the forehead of the horse — propped up in front, but as to his haunches allowed to droop towards the ground — a horn of portentous size, thus converting him for the nonce into the national unicorn. Grouped about the battered base the photograph shows a score of boys all on the broad grin, some one of whom was probably the leading spirit in carrying out this piece of insular wit.

Another equestrian statue of the same monarch, also by Van Ost, is mentioned as having been set up in Grosvenor Square in 1726 by Sir Richard Grosvenor, and as it, too, was of lead and represented a not too popular sovereign, it is small wonder that it was hewn limb from limb not long after it was put up.

Though set up in turbulent Cork where one would think the statue of a Protestant king would not be likely to have a prolonged existence, the equestrian statue of George II placed on the Parade survived for nearly one hundred years; but it, too, at length disappeared between two days, though it was at length found in the river where some laborious party, inspired by spite, playfulness or artistic disgust, had taken the trouble to deposit it.

Still another leaden equestrian statue — which has a peculiar interest for Americans — is known to have disappeared. The Princess Amelia caused an equestrian statue of her father in the character of Marcus Aurelius, to be executed by Beaupré under the supervision of Joseph Wilton, R. A., and placed in Berkeley Square. This statue, of indeterminate but probably mediocre merit, is of much interest to us since it is the original of the first equestrian statue that was erected in this country, unless perchance it was the original itself and not a duplicate that on August 21, 1770, was set up in the Bowling Green in New York City; but this is not likely seeing that lead statues were to be had so cheap. As might be supposed the statue, set up in a time when the revolutionary ferment had already began to work, was received with scant applause from the citizens who, before long, began to inflict upon it those indignities to which its base companions had already been subjected in England. But mere provincials were not to be allowed to insult the King's majesty unrebuked, and in 1773 an edict was decreed that any one caught defacing the statue should forfeit £500 or endure a year's imprisonment. How great damage had been done before the night of July 9, 1776, no one can tell and it does not much matter, for that night saw the destruction of the first equestrian erected in this country. Enflamed by the reading of the Declaration of Independence, the news of the signing of which had but just arrived from Philadelphia, a party of forty picked men under the leadership of Captain Oliver Brown, afterwards an artillery officer of the Revolutionary army, fixed ropes around the King's neck and the group was pulled to the ground and cut to pieces. The (supposed) mane and tail of the horse and the cap of the pedestal, — after serving both as tombstone and doorstep — are now in the rooms of the New York Historical Society. The greater part of the statue was sent to Litchfield, Conn., where the loyal ladies of the town melted it down and from it cast 42,000 bullets, many a one of which doubtless found a billet in English or Tory supporter of the original. Of the fate of the head of the king the *Magazine of American History* says that "Colonel Montresor tells a curious story of the fate of the head of his Majesty's statue that was pulled down by the Liberty Boys at Bowling Green, New York, in July, 1776. 'Hearing,' he writes, 'that the rebels had cut the King's head off the equestrian statue (in the centre of the Ellipps, near the Fort) at New York, which represented George the Third in the figure of Marcus Aurelius, and that they had cut the nose off, clipt the laurels that were wreathed round his head, and drove a musket bullet part of the way through his head, and otherwise disfigured it, and that it was carried to Moore's Tavern, adjoining Fort Washington on New York Island, in order to be fixed on a spike on the truck of the flag-staff as soon as it could be got ready — I immediately sent Corby through the Rebel Camp in the beginning of September, 1776, to Cox who kept the Tavern at King's to steal it from thence, and to bury it, which was effected, and was dug up on our arrival, and I rewarded the men, and sent the head by the Lady Gage to Lord Townshend in order to convince them at home of the infamous disposition of the ungrateful people of this distressed country.'" — (Evelyn's "*In America*.")

The House of Hanover is nothing if not clannish, and it is strange that more was not done by the family to preserve the statues of the

Leicester Square!!! A-rt-n the (B) Ædile. "Ha! Now that's a style of art I flatter myself I really do understand!" — *Punch.*

Georges, which, if Thackeray may be believed, could hardly have been less attractive than their originals. Thackeray found so much matter for his satire in the lives and characters of the originals that he seems not to have thought it worth while to fling a passing gibe at these leaden monstrosities, but in a "Small-Beer Chronicle" in his "*Roundabout Papers*" he pays his respects to another of the family, William, Duke of Cumberland, son of George II:

"Look at William, Duke of Cumberland, with his hat cocked over his eye, prancing behind Lord George[1] on his Roman-nosed charger; he, depend on it, would be for getting off his horse if he had the permission. He did not hesitate about trifles, as we know, but he was a very truth-telling and honorable soldier: and as for heroic rank and statuesque dignity, I would wager a dozen of '20 port against a bottle of pure and sound Bordeaux, at 18*s.* per dozen (bottles included), that he never would think of claiming any such absurd distinction."

As in the case of his father, whose horse ran away with him at the battle of Dettingen, after which episode he dismounted and fought afoot, there was some appropriateness in representing William on horseback, for he was a soldier of considerable ability, but of uncontrolled ferocity, which earned for him the soubriquet of the "Butcher of Culloden," because of the atrocities he visited on the followers of the Pretender after that disastrous battle. In his "*History of London*," Knight makes a plea for the preservation of this statue in these words:

[1] Bentinck statue in the same Square.

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"When that purification of our public statues, which there is so much reason to hope for, shall take place, and none be left standing that do not fulfil the conditions which morality and art are alike interested in demanding from the men whose effigies are to adorn our high places, we trust one exception may be made — the Duke of Cumberland's statue. Let not that be destroyed; keep it, if it be but to inscribe on it, for the good of the people, the people's own short summary of his character, and thus leave it to posterity. Who shall say what suffering and disgrace may not be spared in future wars, if wars there must be, by so decisive and permanent an expression of a sound public feeling?"

This statue, which by some is said to have been of richly-gilt lead, and by others to have been executed in marble by Cheere, was set up in Cavendish Square, London, in 1770, by Lieutenant-General William Strode in acknowledgment of benefits received at his hand; and, though generally considered a poor piece of work, was interesting because the Duke was shown in the full military costume of the period, and not in Classic undress. The group was either destroyed or removed a few years ago only.

George I. — Born 1660. Ascended the throne of England, the first King of the Hanoverian line, in 1714. Died 1727.

George II. — Son of George I. Born in 1683. Ascended the throne, 1727; Died in 1760.

George III. — Grandson of George II. Born 1738. Ascended the throne in 1760: died 1820. Imbecile during the last ten years of his life, so that the Government was placed in the hands of the Prince of Wales [George IV] as regent.

William, Duke of Cumberland. — Son of George II (1721-1765). ("The Bloody Butcher," so called from his cruelties in suppressing the rebellion incited by the Young Pretender in 1745.) A brave soldier but an unfortunate one. Fought at Dittingen. Defeated the Scotch at the battle of Culloden, 1746. Defeated at Fontenoy, Laffeld and Hassenbeck.

The Statue of George I. — "*Old and New London*" says the statue was modelled by C. Buchard and was regilt in 1812. Timbs's "*Curiosities of London*" also ascribes it to Buchard. It was purchased by the inhabitants of the Square.

Canons. — Built by James Brydges, Esq., afterwards Duke of Chandos. Chandos, commonly called the "grand Duke," was a liberal man and the patron of Pope, Hogarth and Handel. The former wrote some well-known lines on Canons, which he termed "Timon's Villa," in his "Epistle on False Taste," addressed to Richard Boyle, Earl of Burlington, and Hogarth introduced Pope, as a whitewasher on a scaffold, bespattering the magnificent Duke of Canons, in his satirical print, "The Man of Taste." Canons cost between £200,000 and a quarter of a million. It was quite a wonder of its age; but in 1747 the family, having lost heavily by the South Sea Bubble and being cramped with the enormous expense incurred in buying so much land (between the town and country mansions), was forced to break up and sell the house. The [pedestrian] statue of George II in Golden Square, London, came from Canons.

George II, Golden Square. — Knight's "*London*," speaking of the pedestrian statue of George II (as a Roman warrior) in Golden Square, which came from Canons, says that at the sale "a gentleman, an acquaintance of the auctioneer, came in, and catching his eye, nodded in token of friendly remembrance. 'Thank you, Sir,' was the immediate comment — down went the hammer — 'The statue of that excellent monarch is yours.' What could the possessor do with such an immense piece of sculpture but give it to the public?"

"Leaden Statuary. — In imitation of the French and Dutch gardens there were few of those in the vicinity of London or in the provinces, the squares or oblong grass plots of which were not embellished by correspondent images, but of pastoral and domestic characters, and rarely borrowed from the heathen myth. The lead has been long since converted to useful purposes. When the demand for them was so great, the trade of making them was very lucrative. A story is told of a Dorsetshire gentleman, whose father had brought two antique marble statues from Italy. Upon his marriage with a city dame, who was determined upon modernizing his old family seat, she ordered that these unfortunate statues should be painted, in order that they should *look like lead.* But Van Ost (or Nost) was an artist capable of much better things; and was probably induced by profit to undertake such mean subjects; or, to superintend the manufactory." — From note by Dallaway to Walpole's "*Anecdotes of Painting in England.*"

"Statues in lead or mixed metal, after the Dutch taste, were all the rage then, and the makers of these works — often clever designers — drove a roaring trade. Piccadilly was full of their yards." — From Tom Taylor's "*Leicester Square.*"

Charpentiere. "A statuary much employed by the Duke of Chandos at Canons, was for some years principal assistant to Van Ost, an artist of whom I have found no memorials, and afterwards set up for himself. Towards the end of his life he kept a manufacture of leaden statues in Piccadilly, and died in 1737, age above 60." — From Walpole's "*Anecdotes of Painting in England.*"

The New York Statue of George III. — In a book of general orders issued by Washington in 1776, under date of July 10, it is said, "Tho' the General doubts not the persons who pulled down and mutilated the statue in Broadway last night, acted in the public cause, yet it has so much the appearance of riot and want of order in the army, that he disapproves the manner and directs that in future these things shall be avoided by the soldiery and left to be executed by proper authority."

Sir Henry Cheere. — [1703–1781.] Pupil of Schumakers. Made monuments to Admiral Hardy, Archbishop Boulter and others in Westminster Abbey. Master of Roubilliac.

[To be continued.]

The Finish of Yellow Pine. — A yellow pine dealer from Alabama says that it will not do to apply oil to that wood in the finishing process. A shellac filling, and a subsequent application of shellac varnish is the proper treatment according to this authority. He says that oil causes the wood to turn a dark and disagreeble color, which is precisely opposite to the natural appearance of yellow pine, which is bright and cheerful. This Alabama man's opinion is not indorsed by some of the dealers and wood-workers of this city. Yellow pine is often finished in oil here and thus treated is considered richer and handsomer than when finished with shellac varnish only. It is true that oil gives a darker appearance to the wood, but its richness and tone is thereby secured, and that staring, vulgar, cheap appearance, that is sometimes alleged of yellow pine is obviated. It is all a matter of taste. You can finish your yellow pine in oil or shellac, and have a handsome effect in either case. — *Northwestern Lumberman.*

MEDIÆVAL HOUSES.[1] — VII.

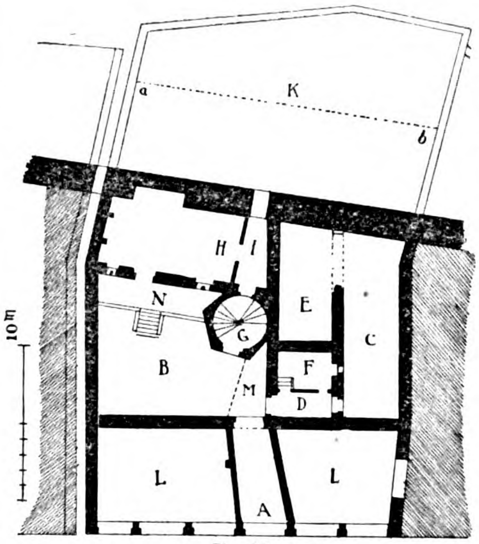

Fig. 32.

In several of the then flourishing cities of the south, now little known, there still exist dwellings of the thirteenth and fourteenth centuries which combine the features of hôtel and ordinary house. The rich merchants of these municipalities on the borders of the Garronne, the Aveyron, the Tarn and the Lot, in whose breasts the Gallo-Romanic traditions had been deeply implanted, built their hôtels with shops on the street, either for their own business or to rent. Such buildings were frequent at Toulouse, Alby Saint-Antonin, Cordes, Gaillac and Villeneuve-d'Agen.

Figure 32 is the plan of one of them in the main street of the town of Cordes, overlooking the promenade of the "Bride." At the right and left of the entrance *A* are the stores or stalls opening on the street. At *B* is the principal court, and at *C* a small court reached by the passage *D*. The open room *E* served probably as a stable. *F* is a store-room. A large spiral staircase *G* gives entrance to the great *salon* of the lower floor *H* raised seven steps above the ground of the court. A passage *I* communicates with a garden *K* situated outside the old ramparts against which the hotel is set. Buildings of a more recent date have been constructed over the garden from *a* to *b*. The stores *L L* had no access to the court, and probably those who occupied them lodged elsewhere, at least when these stores were not used by the proprietor of the hotel. The great staircase *G* leads in the upper story into a room situated over the *salon H*, and communicating by a wooden passageway *M* with the rooms in front, which are only divided by partitions. There is a second story above these front rooms, reached by the great staircase and a second passage. The stable and store-room were on the ground-floor. A little terrace, *N*, with steps, descends to the court from the front of the *salon H*. This dwelling, which dates from the first years of the fourteenth century, is typical of the hôtel of the Middle Ages. Stores opened on the street, and the lodgings were in the front rooms of the first and second stories. The remains found of hôtels of the thirteenth and fourteenth centuries in the northern towns are not complete enough to indicate the plans of those dwellings. We will only state that they contained courts with porticos on one or two sides, a number of retired rooms opening on the courts or gardens, and common rooms placed in the neighborhood of the street.

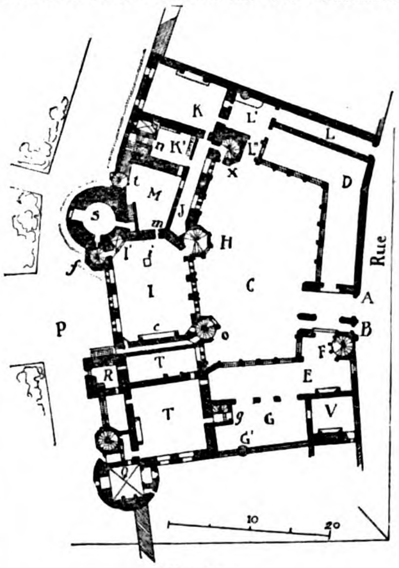

Fig. 33.

The most ancient edifice of this kind still existing is the Hôtel of Jacques Cœur, at Bourges. This splendid dwelling was built on the old wall surrounding the town, which Jacques Cœur owned under a fief. The plan of the ground-floor is shown in Figure 33. The towers *R*, *S*, *Q*, formed part of the ramparts of the town and were in condition to be utilized. *S* was crowned by a rich battlemented pavillion, and a staircase gave access to it as in the tower *Q*. The rampart upon which the front wall was laid formed a very obtuse angle, and obliged the architect to give to his buildings the irregular shape which we observe upon the court; in those days they thought less of symmetrical combinations, and they profited by the accidents of the ground as much as possible.

The entrance to the hôtel, on the street at *A*, has a porte-cochère with a postern *B* at the side; the staircase *F* leads to the chapel

[1] Translated from the French of Viollet-le-Duc, by Mr. A. B. Bibb. Continued from page 247, No. 674.

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situated above the entrance. From the outside it was thus easy to reach the chapel without going into the interior of the house. From the entrance *A* for carriages or horseback-riders, and from the postern *B* the great court *C* is reached, and the walled porticos *D* and *E*. The latter portico was lighted by the court *G*, having a well at *G'*. At *H* is the great stairway giving entrance on the ground-floor to a large dining-room *I* and to a passage *J*, communicating with the kitchens at *K* and *K'*. The kitchen *K'* had an oven, a fireplace and a cooking-stove. From the street there was a direct entrance into the kitchens through the passage *L* and the servants' small court *L'*, communicating with the great court by the passage *L''*.

The great dining-room, heated by an immense fireplace *C*, had a small gallery for musicians who reached the gallery without passing through the dining-hall by a staircase *f*. On the floor of the dining-hall a trap-door opens into the cellars. Whether this trap was intended for the use of the butler, who could thus have fresh wine brought in during the repast, or whether it was intended, as some think, to allow the silver to be quietly thrown into the cellar in case of fire, is not quite clear. The great fireplace *C*, with an opening of six metres, was richly decorated, its mantel showing a fortified town and its sides two nude statues of Adam and Eve, separated by the tree of knowledge. *M* was a pantry from which by the opening *m* the dressed-dishes could be passed into the dining-room. The small, straight stairway in this pantry descends to the lower story of the tower *S*, which served as an annex to the pantry. Opening out of the small kitchen *K*, and below the bake-house, is a vaulted wash-room fed by pipes from a hidden well. Latrines for the servants were placed at the side of this wash-room under the masonry of the staircase. A stairway *n*, puts the kitchen in communication with an entresol of the tower *S*, and the first story is gained by the spiral stair *t*.

The little court *L'* has a beautiful well, fitted with pipes which supply the reservoirs in the large kitchen, *K*. From the kitchens the meats were carried into the pantry through the passage, *J*, by a private door under the great staircase *H*. Under the staircase, *O*, is a passage which puts the great court into direct communication with the Place de Berri, *P*. At *T*, *T'*, are two large rooms, whose use is not known, but which seem from their arrangement to have been used as chambers, with wardrobes in the square tower, *R*. All this angle, including the tower, *Q*, constitutes a complete independent apartment, whence one could, from the great chamber, *T''*, descend to the small court, *G*, by the staircase, *g*, or mount to the upper stories. The conciergerie was at *V*, and the gallery, *D*, served as a place of reunion for the poor, to whom the remnants of the feast from the table of Jacques Cœur were distributed. The poor had no access into the hôtel, but could wait under shelter until they received from the kitchen what was saved for them. The staircases *X*, *H*, *O*, *g*, ascend from the ground to the upper floors.

This plan is irregular and of great extent. Each department has its own place and is independent of the rest, while communication between them all is easy. At the right of entrance, the culinary department has its court, its own entrance and its large portico for the distribution of alms. In the front is the principal staircase for the upper apartments and the dining-hall of the ground-floor. At the left is a complete independent apartment with its own court and portico, allowing the occupant to go in and out in privacy.

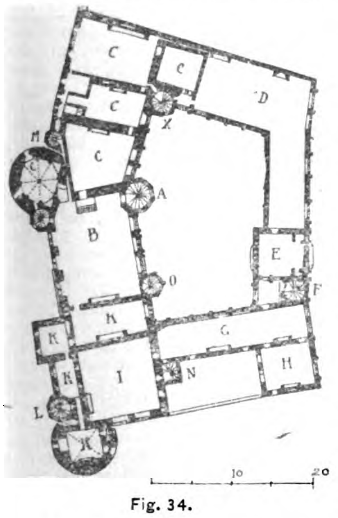

Fig. 34.

Few of the hôtels of the seventeenth century can boast arrangements so commodious and well studied. Figure 34 is the plan of the first floor of Jacques Cœur's house. The principal staircase, *A*, gives entrance to the great *salon*, *B*, which has a stage or platform like the great *salons* of the châteaux. The living-rooms were at *C*. They communicated with the great *salon*, *B*, and with the gallery, *D*, by side passages and direct entrances. From the gallery, *D*, the chapel, *E*, was entered, and it could also be reached directly from the lower floor by the staircase, *F*. Another gallery, *G*, joined the chapel, and the *salon*, *I*, and the separate apartment, *K*, which had a private staircase, *L*. The principal apartment, *C*, is reached by the staircases, *M* or *X*. The *salon*, *I*, has an exit by the stairway, *N*, the great *salon*, *B*, itself beside the grand staircase, having a second stair at *O*.

On the first story, as on the ground-floor, the different departments of this hôtel were independent, so that the rooms for reception did not encroach upon the private life of the inmates. As in the châteaux, the programme was one of complicated requirements. It is certain that these numerous and dissimilar arrangements seemed indispensable, and that they sacrificed all idea of symmetry to the necessities of the dwelling as they then comprehended them. It will be observed that the living-rooms, aside from the great apartments, were supplemented by numerous closets and wardrobes, which could not have been very large and that all these apartments great and small, were lighted.

Jacques Cœur, in utilizing the Gallo-Romanic towers of the ramparts had not, perhaps, been sorry to give to his hôtel the appearance of a feudal domain, and the preservation of these towers necessitated the irregularities of the plan. The architecture was adapted, however, to this lack of symmetry, and nothing is more picturesque, more brilliant, than the interior of the court, with its stair-towers and many roofs, surmounted by chimney-tops, spikes, dormers and leaden ridges decorated and painted. We give at Figure 35 a bird's-eye view of this hôtel taken from the point *P'* in the plan of the ground-floor.

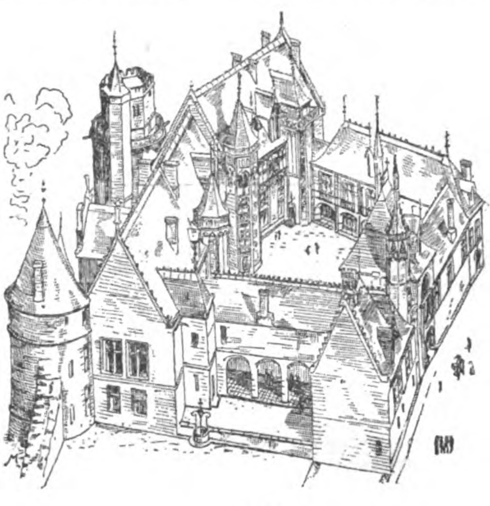

Fig. 35.

The construction was treated with extreme care, and the carving is charming in style and appropriate to each division. The sculptures include many devices of hearts, feathers, shells, etc. In the groups over the three arches of the chapel staircase, the sculptor has placed a priest dressed in his robes blessing the water; behind him a young priest who rings for mass, while in the background comes a beggar on his crutch, symbolic of the accessibility of the holy rite to all. The second bas-relief represents priests dressing the altar. In the third, women come to confession preceded by a child, who opens the door. At the top of the stairway is a fourth bas-relief, representing the Eternal Father with two adoring angels. Above the door of the stairway on the kitchen side is carved a large fireplace, before which roasts a chicken, a child turns the spit, a woman washes dishes, and the cook pounds spice in a mortar. Among the carved or painted devices we read these: "To valiant hearts nothing is impossible." Afterward, the enigmatic words: "*Dieu. faire. taire. de. ma. joie*"; and this: "Into the shut mouth the fly does not enter." Jacques Cœur had adopted for his arms: blue on a fesse of gold, with three shells sable and three hearts gules placed two in chief and one in point.

The vaultings of the chapel were painted; in each of the triangles of the arch is an angel clothed in white, holding a phylactery and relieved against a blue background starred with gold. These paintings are well executed and passably preserved. We know how dearly this celebrated parvenu merchant of the fifteenth century must have paid for such magnificence. The man was, in fact, one of the most remarkable personages of our country, and his dwelling is interesting from all points of view.

(To be continued.)

COMMUNICATIONS

FROST-PROOF MORTAR.

BOSTON, MASS., December 1, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Noticing in to-day's issue of the *Architect* the paragraph about frost-proof mortar, it seemed to me that an experiment made last winter might be of interest to those engaged in building operations: Last winter, it was necessary to lay up some granite piers during the coldest weather, and, as piers were small in section and heavily loaded, it was thought best to use clear Portland cement, so as to avoid unequal settlements that might be caused by shrinkage of lime-mortar. After some preliminary experiments with salted cement-mortar exposed immediately after mixing to temperatures of ten degrees to twenty degrees Fahrenheit, I directed the mason to add eight per cent of rock-salt to water used with the cement; and although during the time that the piers were being laid up the temperature at night was often as low as ten degrees Fahrenheit, in no case was the cement injured so far as could be observed, and even a

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thin wash of cement running over face of pier from some of the joints was found, six months later, to adhere so firmly to stone as to be removed with some difficulty when scraped with a knife. The idea, as you know, was one I got from your paper, but until I tried the experiment I did not know whether salt had been used for that purpose in this country, or whether, with the extremely low range of the thermometer, it would prove successful.

Yours, * * *

ARCHITECTURAL SCHOOLS.

Zanesville, O., November 24, 1888.

To the Editors of the American Architect: —

Dear Sirs, — If not too much trouble, will you inform me which school you think the best for a first-class draughtsman to attend in order to fit himself for the profession.

Respectfully yours, Benj. S. Hubbell.

[If you can afford to spend the necessary time, you will find the Architectural Department of Columbia College, New York, the best. — Eds. American Architect.]

NOTES AND CLIPPINGS

Deafness Caused by the Electric Light. — A curious phenomenon was recently related by M. D'Arsonval before the French Academy of Medicine. After gazing for a few seconds on an arc-light of intense brilliancy, he suddenly became deaf, and remained so for nearly an hour and a half. Surprised and somewhat alarmed in the first instance, but reassurred by the disappearance of the symptoms, he repeated the experiment with the same result. When only one eye was exposed to the light no very marked effect was produced. — *Sanitary News.*

Rats and Lead Pipes. — Fully one-half of the unexplained cases of burst or leaking lead pipes, says a St. Louis plumber, are due to rats, and not to flaws in the metal. In a well-cemented basement, with cement floors, etc., as nearly vermin proof as can be, the annoyance from rats is the greatest, as, being unable to find water, they are driven frantic by the sound of it flowing through the pipes, and they proceed to eat their way to it. The aforesaid plumber, much against the interest of his profession, suggests that here is a modest opportunity for the inventor to contrive some coating for the pipe which shall kill the rat before he taps the water. — *Exchange.*

An Exhibition Catalogue, 1851. — A correspondent of our contemporary, *Fairplay*, has unearthed a comic catalogue written in connection with the Great Exhibition of 1851. It certainly is rather entertaining.

I've had a private view of the Exhibition book,
I mean the authorized catalogue, and from it straightway took
The names and numbers of the curious things to see,
And curious you'll say they are, if you'll attend to me.

No. 1's A bucket of water taken from "All's well,"
" 2's The coat that's worn by the Ocean's heavy swell,
" 3's The weight exact of a grain of common sense,
" 4's Some of the tar with which once Israel pitched their tents,
" 5's A pat of butter, made from the cream of a joke,
" 6's The tail of the pig that was got into a poke,
" 7's The gingham queer that Louis Philippe did borrow,
" 8's The saucer with which to match the cup of sorrow,
" 9's The loaf from which the crumb of comfort fell,
" 10's The brush that paints the sign of the times so well,
" 11's The marrow from the bone of contention taken,
" 12's The rasher of the man who saved his bacon,
" 13's The strap that sharpens up the water's edge,
" 14's The apple of the eye of faith, so they allege,
" 15's The two original stools thro' which the chap was floored,
" 16's The soap that washed the captain overboard,
" 17's The nose cut off our noble country's face,
" 18's The naughty gander caught in a wild goose chase,
" 19's A splinter taken from the River Styx,
" 20's From the house that Jack built, twenty bricks,
" 21's The teeth from the Mississippi's mouth,
" 22's A Scotchman who never travelled South,
" 23's Some coins from the change of the moon, in pence,
" 24's A link from the chain of evidence,
" 25's The wheel of fortune, spokes and staves,
" 26's The pen with which Britannia rules the waves,
" 27's The baby's mouth that was born with a silver spoon,
" 28's The swarm of bees that made the honey moon,
" 29's The bow that shot the shaft of ridicule,
" 30's A grammar from adversity's old school,
" 31's The bit of steel that made the Iron Age,
" 32's The livery worn by History's page,
" 33's The rock to manufacture flinty hearts,
" 34's The barb from one of wicked Cupid's darts,
" 35's Some bits of daylight, picked up when morning broke,
" 36's The cork that fits into the bottle of smoke.

I've sung in numbers, and of numbers up to thirty-six;
Success to Albert and the Queen, and all the little Vic's;
With parting directions, my ditty shall be done,
But when you go to see the numbers, look out for number one.

TRADE SURVEYS

Neither the national law-makers nor the people will listen to the appeals of railroad-managers to radically modify the Interstate Law, nor will any serious evading of that law be tolerated. The railroad-managers are dancing a sort of preparatory war-dance among themselves, preparatory to the attack upon Congress for such modification of the Interstate Commerce Law as will allow them to cut each other's rates in the old-time way. The law will stand with such modifications as the Commission in its forthcoming report, it is understood, will suggest. The much-talked-of scheme for concentrating almost one-half of the railway system of the United States into practically one, is neither practicable nor reasonable, and is not in accordance with the spirit of the law, or with the instincts of public sentiment which is behind the law. The difficulties of the railway-managers, whatever they may be, must be fought out upon the present line, and the people will accept the opinion of the Railway Commissioners, that by honesty of purpose and energy all obstacles can be removed. The Bessemer steel-rail capacity has been so much increased within the past year, that the managers of that vast interest have been unable to establish harmony on quotations for the business of the ensuing season. About 50,000 tons of rails have been sold at below cost; namely, at $26, some say a little less. Eastern makers are endeavoring to establish bottom quotations at $28 to $29, and, in consequence of this uncertainty of prices, a large amount of business that would otherwise be placed is being held back. Nothing new can be safely stated this week concerning railroad-building probabilities next year. Only general considerations can be relied upon to point to the probable constructions of the next year, which will probably foot up 10,000 miles of main track, as against something less than 8,000 miles this year. In financial circles there is every confidence in the continued abundance of currency, and in the paying ability of financial and commercial affairs which are managed with more skill and circumspection now than in years gone by. Money invested failed to pay rent or interest, and there are more opportunities of making money than years ago. Opportunities for investment are still multiplying all over the West and South. An Emigration Convention is to be held next week at Montgomery, Ala., and will be attended by representatives from fourteen Southern and Western States. The purpose is to formulate a scheme by which desirable immigration can be increased from Europe and from the Northern States. One agency for this purpose has been established already by a Chicago concern, and a sort of house-to-house canvass is to be inaugurated in all the larger cities and towns in search of industrious persons in possession of small means, of from $1,000 to $5,000. The recent trip of the Agricultural Commissioner of the State of Alabama into the Northwest, stimulated a great deal of interest among the people of these States, and within the past few weeks several delegations of business men have visited Tennessee and Alabama and Georgia with a view of identifying themselves with the promising possibilities of that locality, to some extent. Enterprising travellers think that there are opportunities for transferring the tide of population from the West to the South, and the railroad-managers, the educators, the manufacturers, the land-owners, the money-lenders and the thinkers of the Southern States are preparing to join hands in some well-directed effort to bring about this very desirable result.

Leading authentic advices from leading builders and architects in States between St. Louis and New York point to the possibility of a more active building season than for years past, although, so far, the expressions of opinion are not numerous enough or exact enough to justify a decided opinion. In New York the season has been backward, but lumber-dealers, mill-men, investors, and architects are now speaking very hopefully of next year. The crisis of unwise building has been reached there, and a reaction is setting in. In Philadelphia the season has been an exceptionally busy and successful one, and builders are already laying plans and buying building sites for an increased activity in building operations next year. In several towns in Pennsylvania, where general industrial pursuits are the chief employment of the people, a great deal of house-building and shop-building will be done: notably, Reading, Harrisburgh, and Pittsburgh. Advices from Chicago point to the strong probability of an active year in building, especially for houses and small shops. At Kansas City and some smaller towns in that section of country, a great deal of work will be undertaken in the way of developing the country through which railroads have already been built. Machine-shops, factories, saw-mills, and a multitude of smaller industrial establishments are to be built, and the makers of machinery who have contracts in hand believe that there will be an increased volume of business of this kind between now and spring. The development of coal mines continues to be a very attractive feature of Northwestern enterprise. The development of the coal-bed is equal in its effects now to the discovery of a gold mine ten or twelve years back. For one person then attracted, there are twenty now induced to go thither. There is a demand for machinery for mines and for workers of machinery, house builders and furnishers, and a score of other artificers. While nearly all other producers of wealth have been complaining of slow trade and narrow margins, the producers of anthracite coal have been barely able to meet the pressing requirements that have been coming in upon them from all points of the compass. The production was in round figures, this year, 35,000,000 tons, as against 31,000,000 last year. The bituminous production shows a corresponding increase. One company in Pennsylvania has carried, this year, a million and a half tons of coal and coke more than last. All the railroads in that State have profited by the extensive demand for fuel. The anthracite region are now on three-quarter time. The bituminous mines will run full. The Monongahela region has shut down. The coal regions of the Western States are running as full as ever. The output of natural-gas is increasing, and an offer to control the supply in Western Pennsylvania is now under consideration. Too many interests are to be consulted, and it is not probable that the scheme will succeed. New gas-lines are projected, and a pipe-line from the Lakes to the Ohio River is also under the consideration of capitalists. In a general way, prices are good for all kinds of manufactured products. Manufacturers, themselves, are taking a wise view of the situation, and are endeavoring to guard against an advance, which would restrict the market and create opportunities for shrewder competitors to undersell them. The trusts are endeavoring to take advantage of the crop-scarcity, particularly in sugar, and are buying up the crop in Louisiana, and are looking after agricultural products as well; but, taking it all through, the people are suffering little from combinations of this character.

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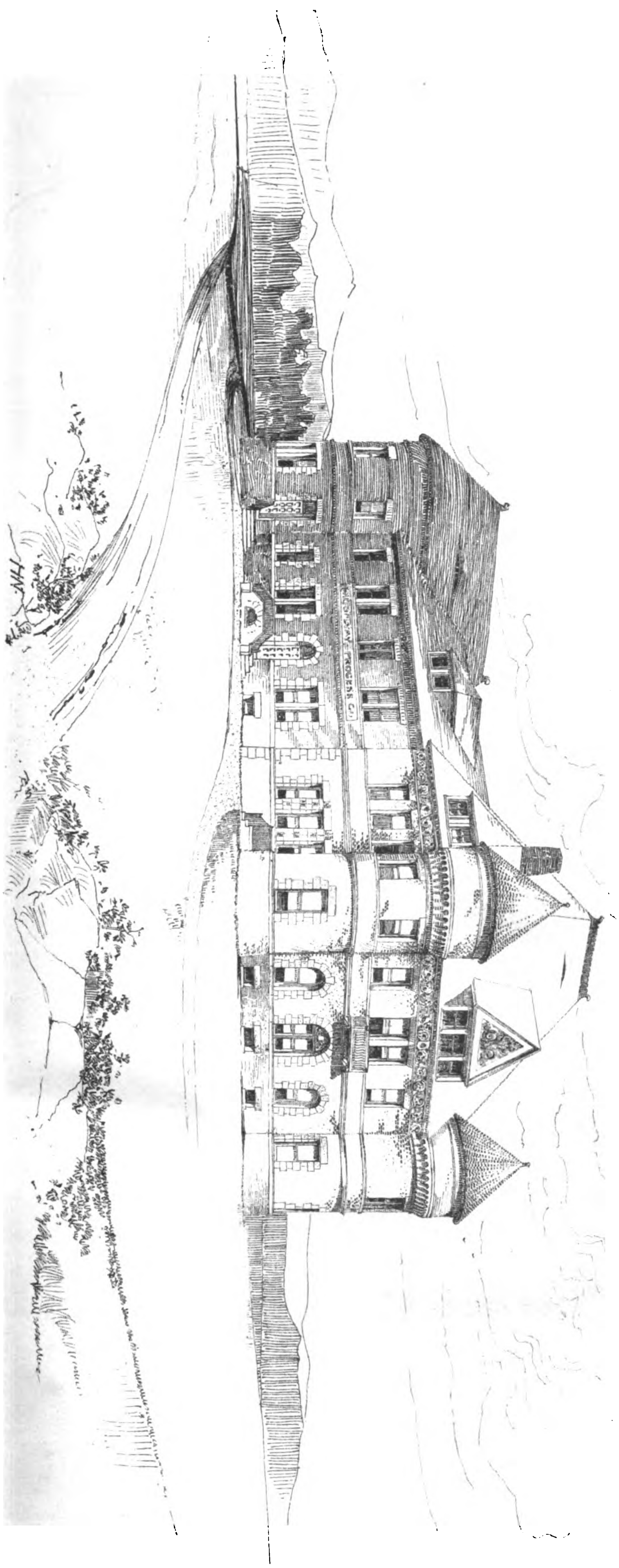

THE SOLVAY PROCESS Co.'s —
ADMINISTRATION BUILDING
— SYRACUSE, N.Y. —
— DOUGLAS SMYTH, ARCHITECT
— NEW YORK.

Douglas Smyth, Arch't.

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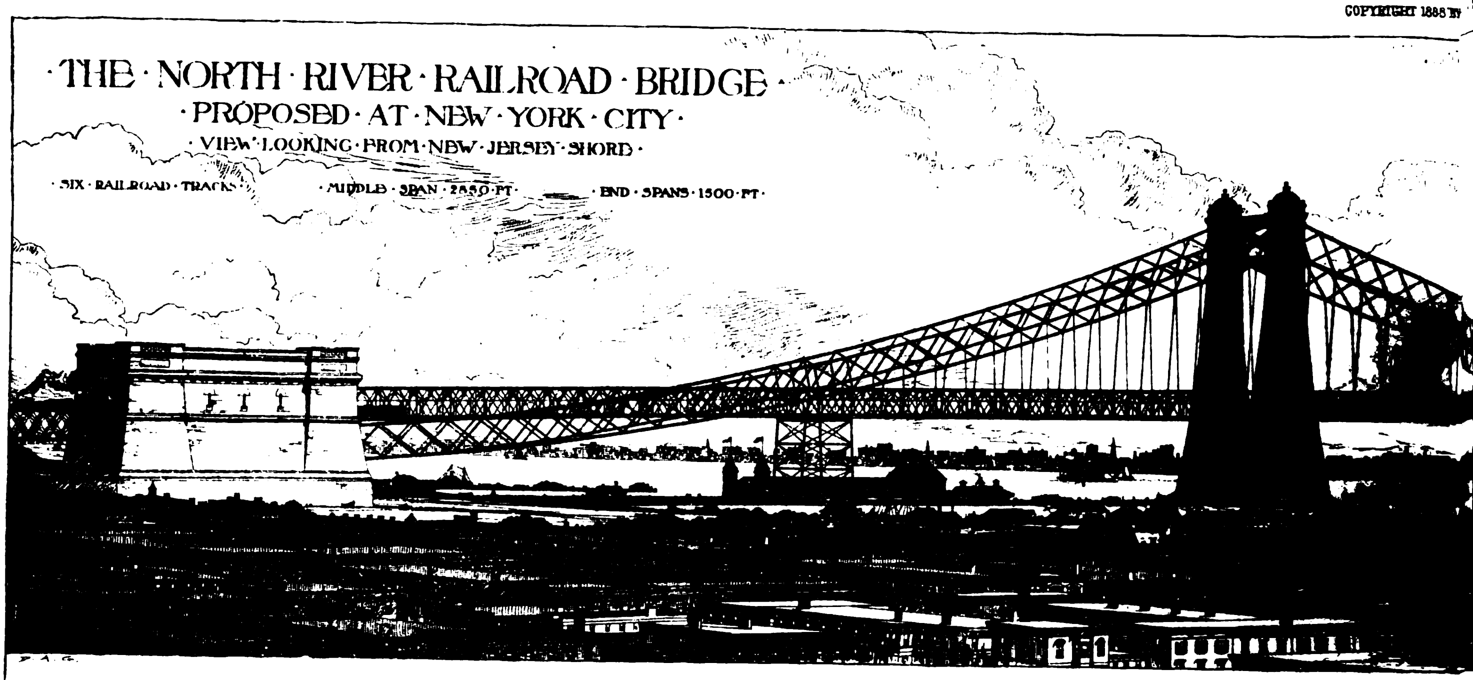
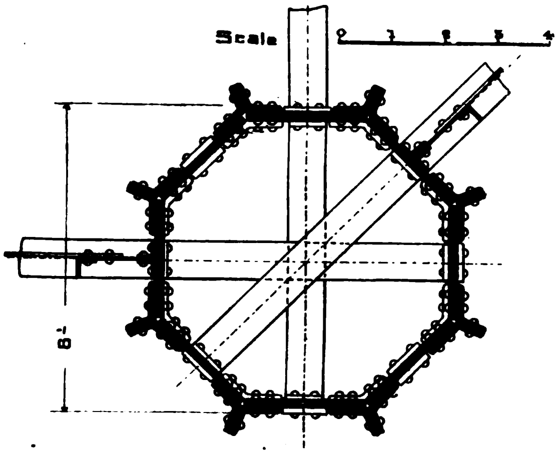
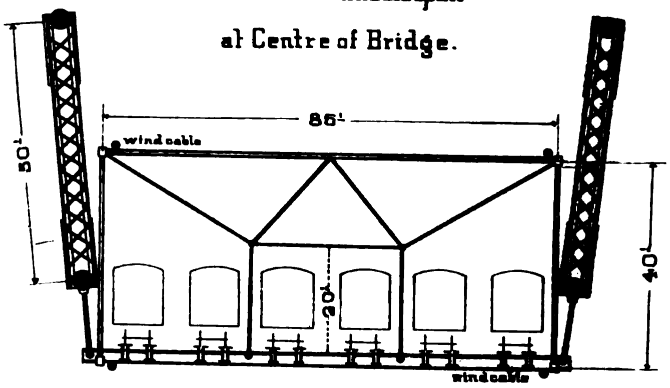
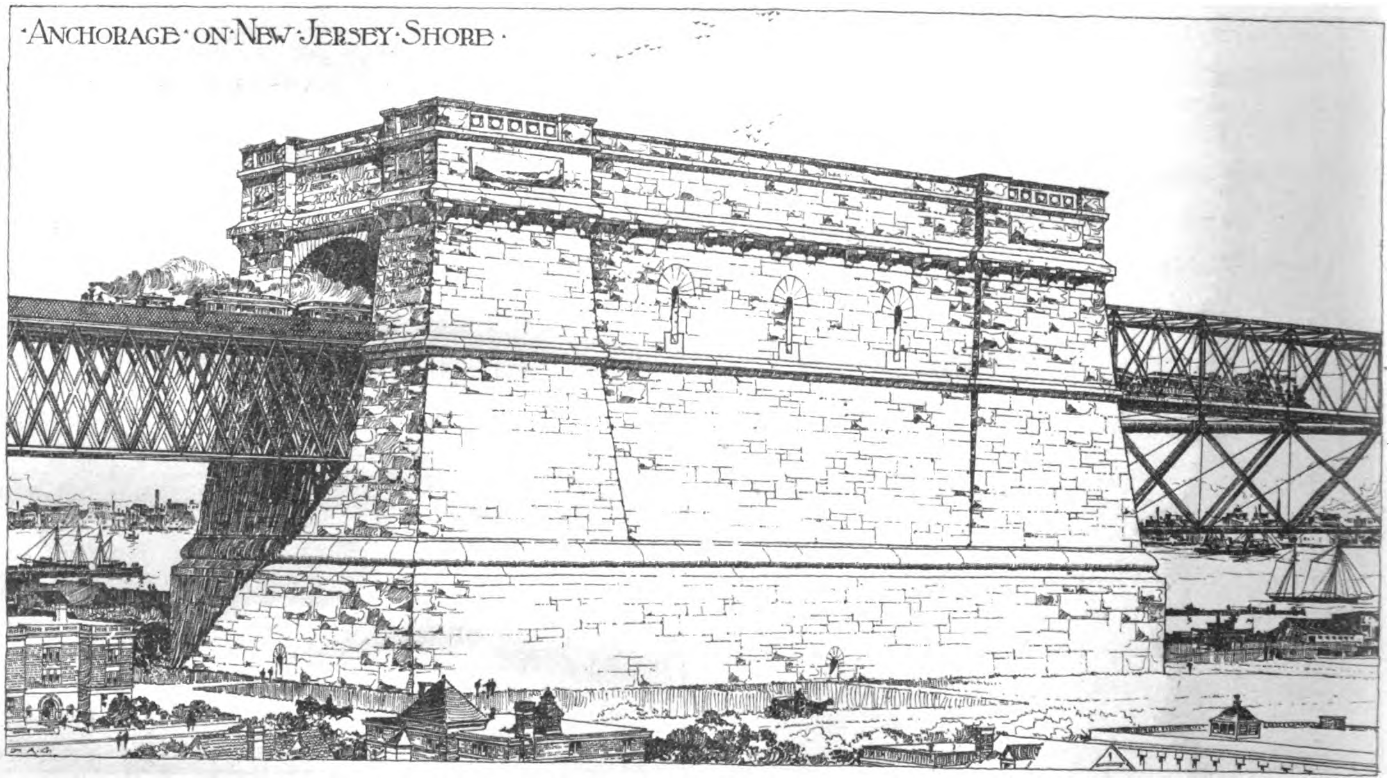




Section of one Tower-Column.

Section of Middlespan
at Centre of Bridge.





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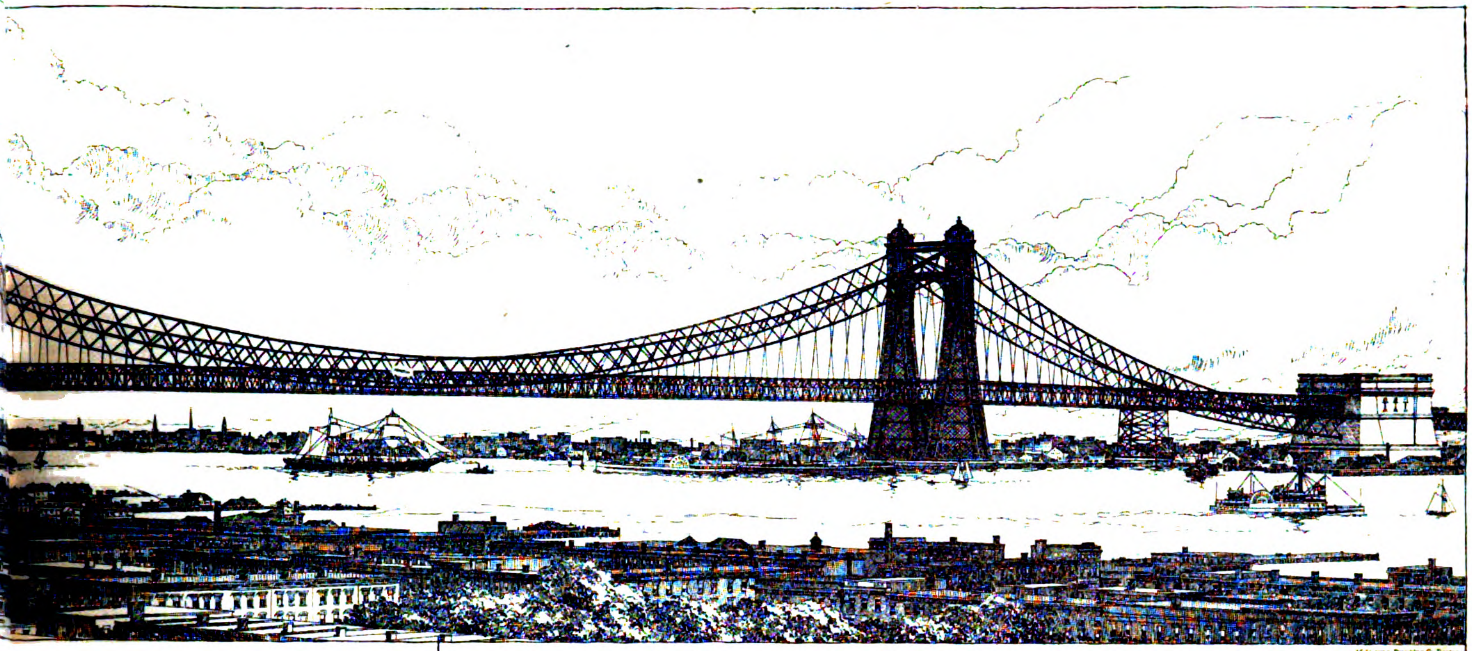

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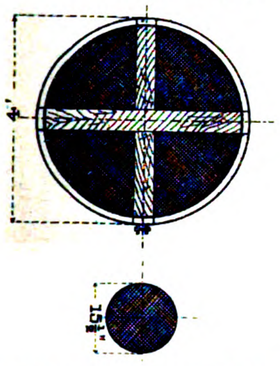
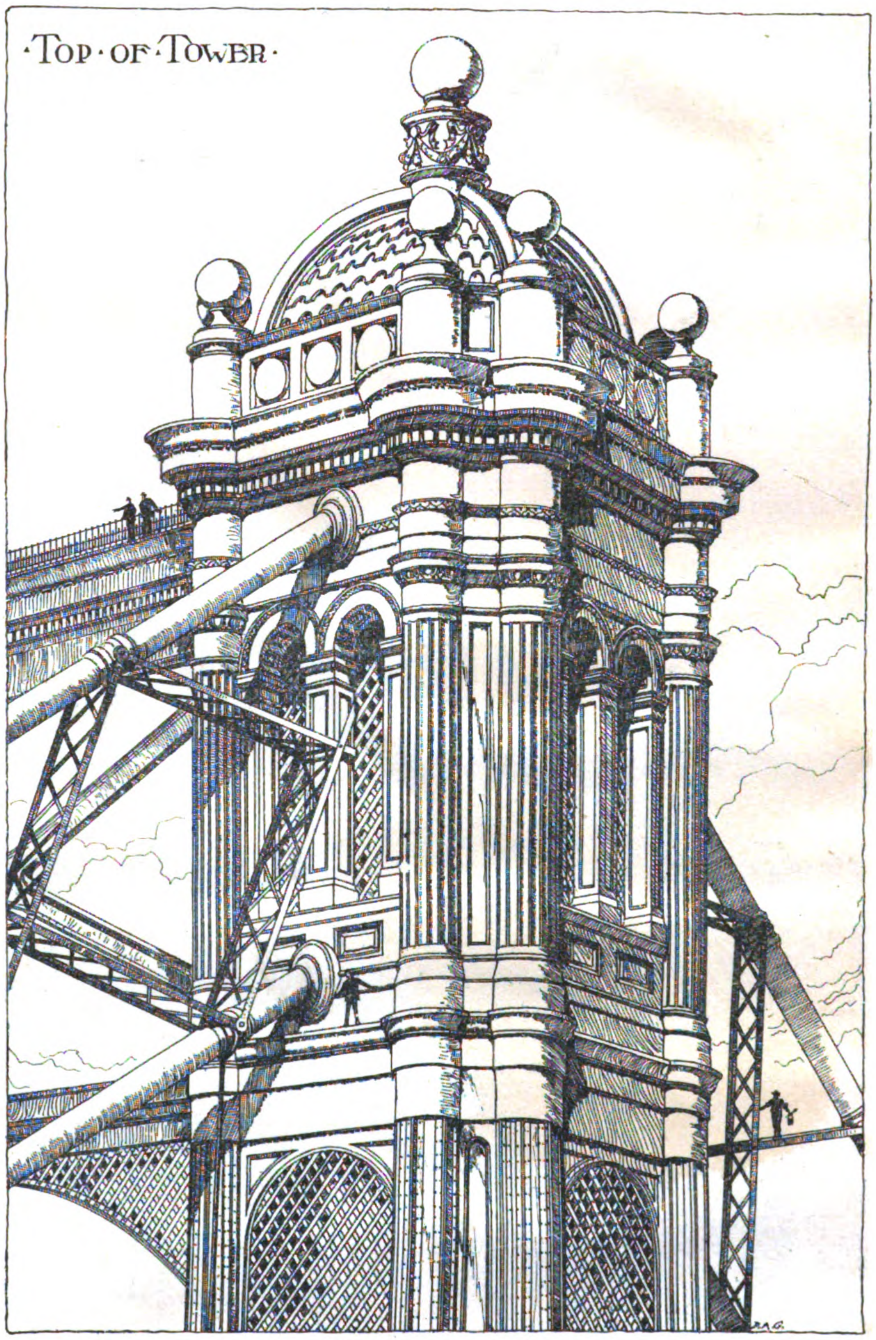
Section of Cable



Cable for East River Bridge on same Scale.



·Designed·by·

·Gustav·Lindenthal·

Consulting·Engineer·

·Pittsburgh·Pa·

And·New·York·City·

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AMERICAN ARCHITECT AND BUILDING NEWS, DEC. 8 1888 No. 676

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A KISS IN LEICESTER SQUARE

LEICESTER SQUARE, ABOUT 1750.

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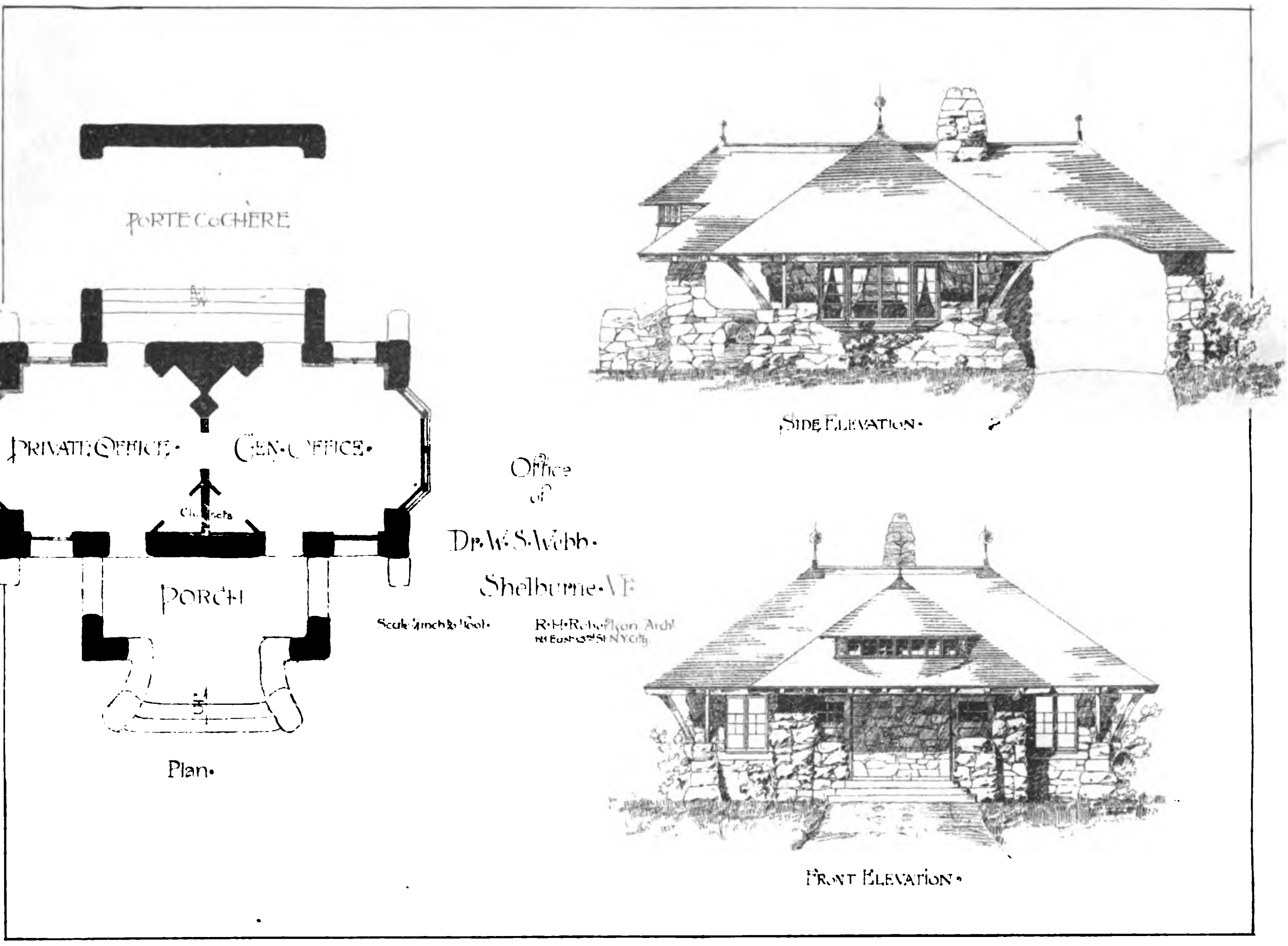

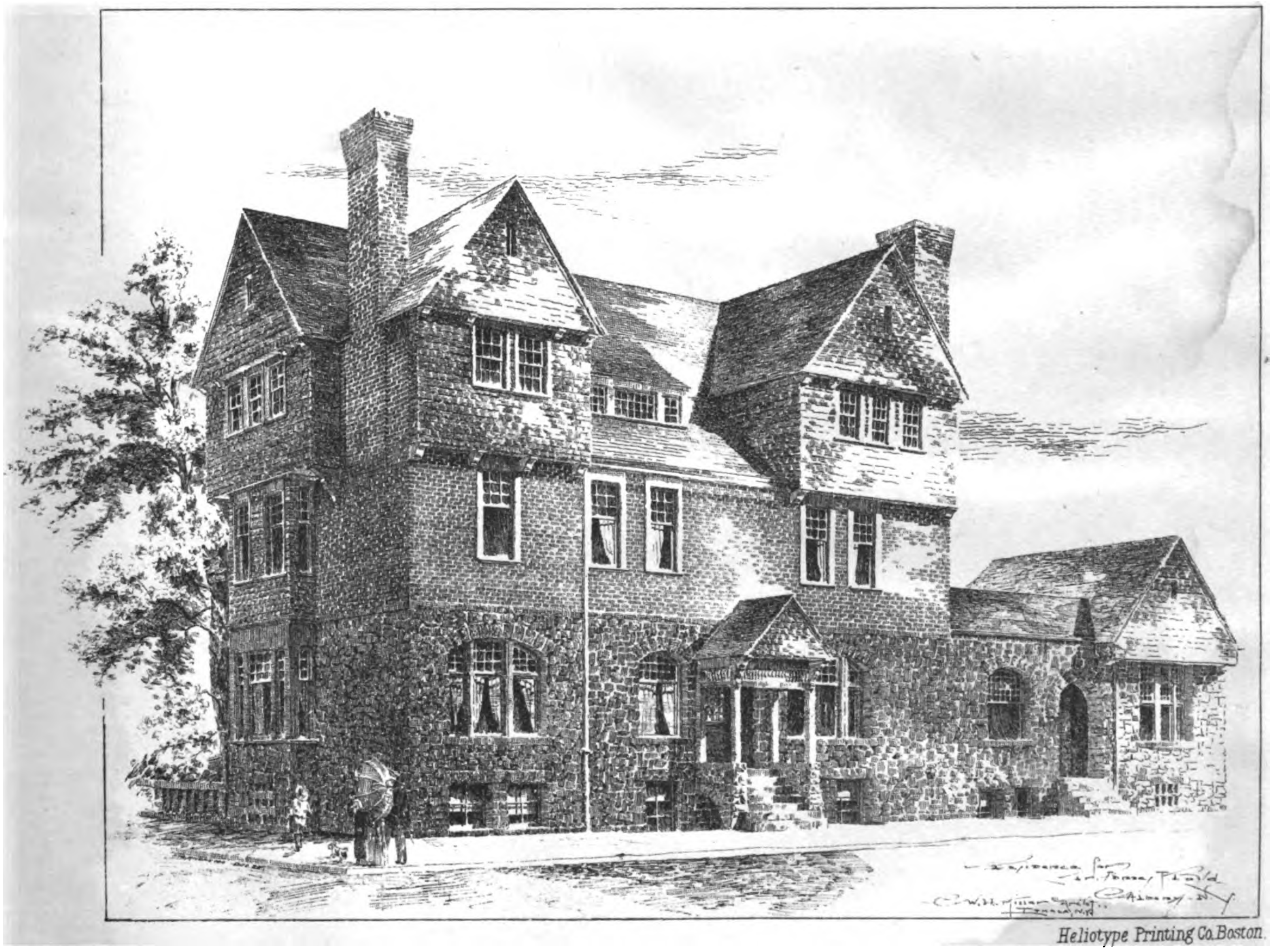

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Dining Room in Residence of Howard Munnikhuysen Esq.

Charles E Cassell Architect
Baltimore, Md.

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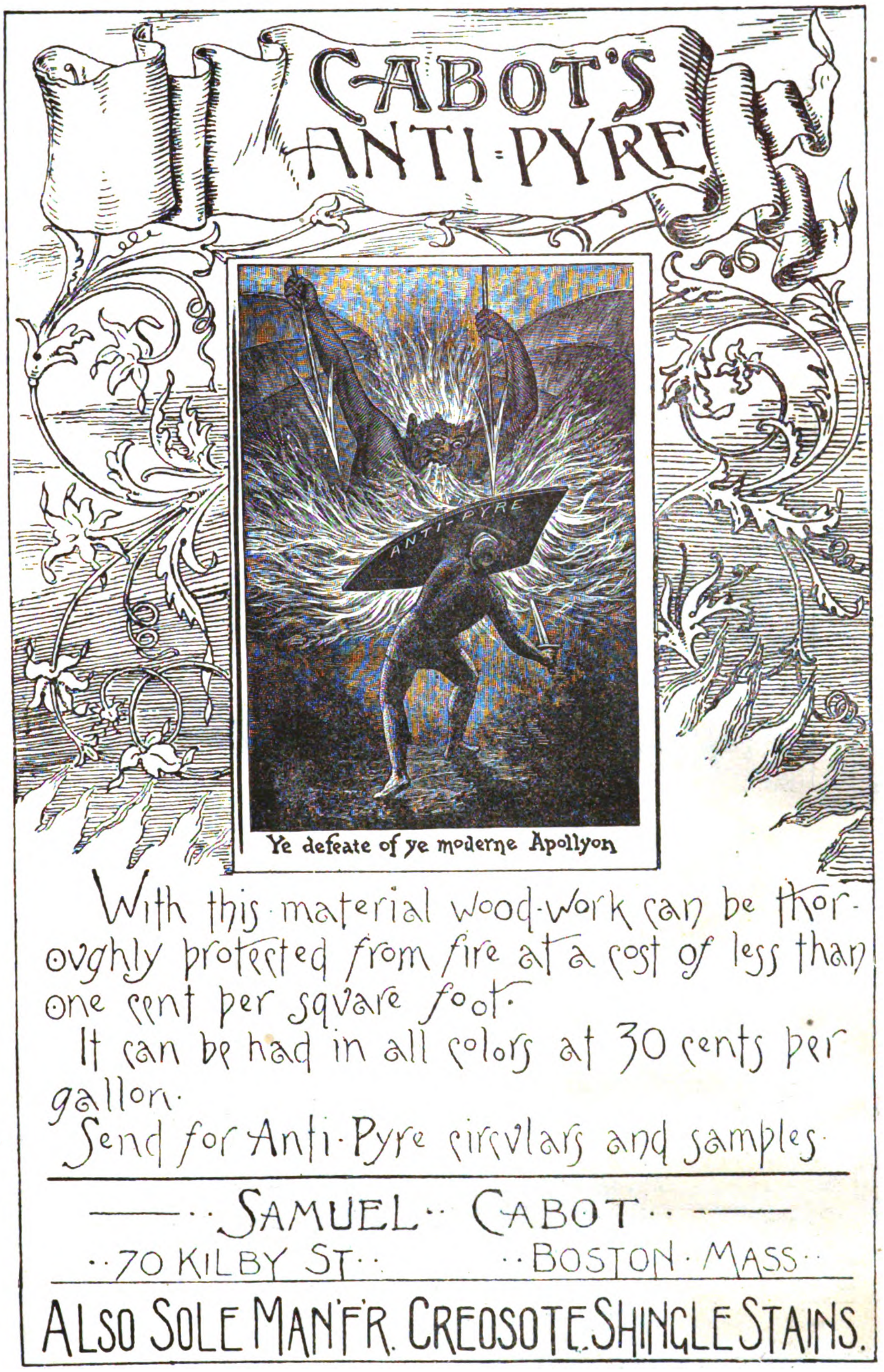

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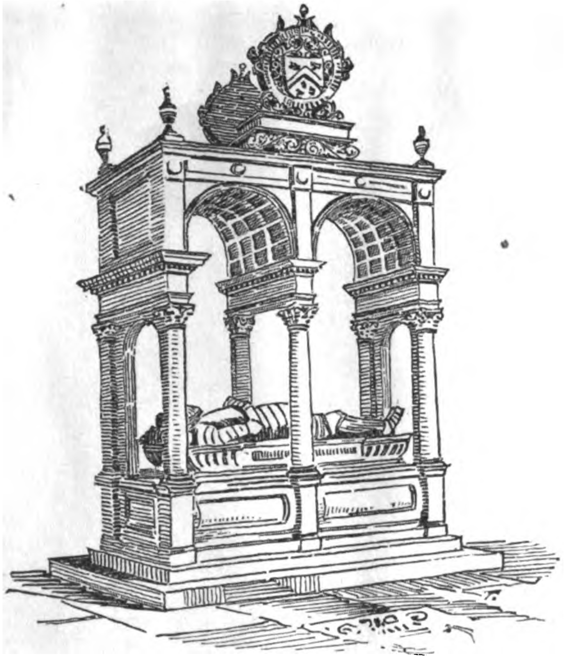
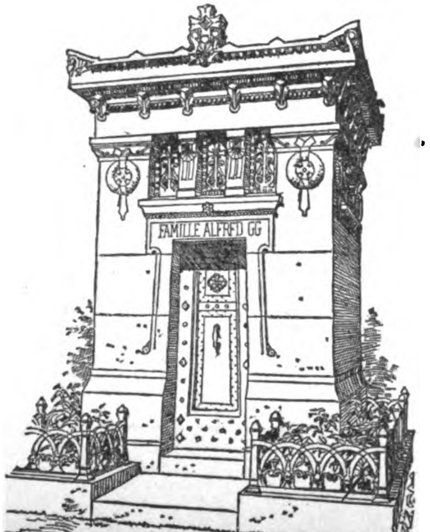
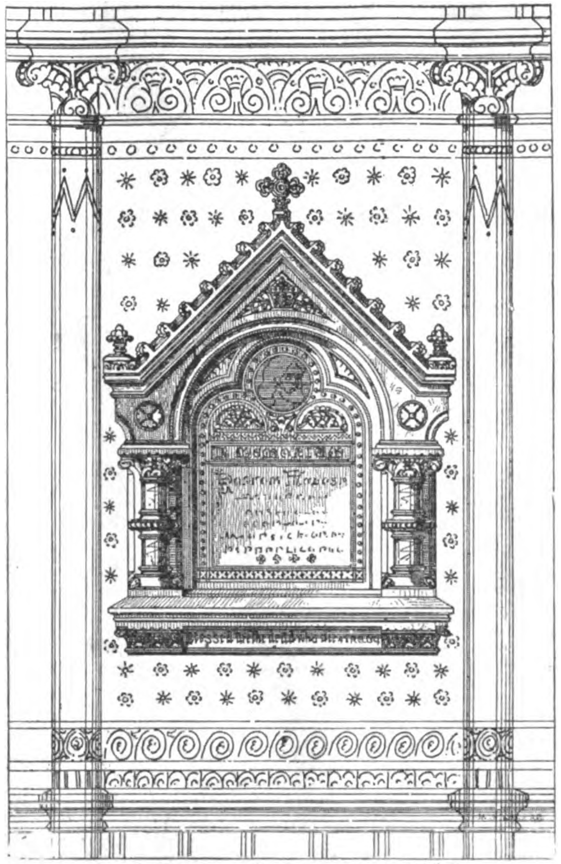


The Gresham Monument. St. Helen's, Bishopsgate, London.

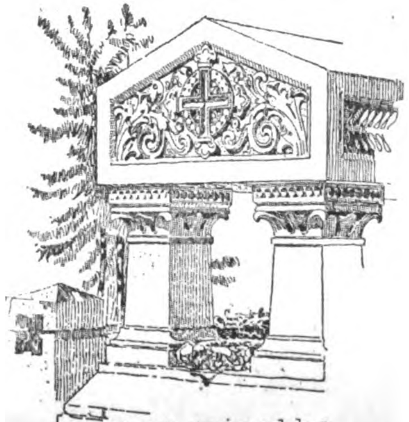


Tomb, Cemetery St. Brice-sous-Forêt. Paris.—M. Vaudremer. Archt.



Mural Tablet. M. N. Cutter, Architect.

Memorial Tablet. Allhallows Barking Ch London.
After sketch by Robert W. Gibson. A.A. Sketch Book London.



Tomb designed by Mr L. Mange. Archt
After. La Construction Moderne

TOMBS AND TABLETS.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIV. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 677.

DECEMBER 15, 1888.

Entered at the Post-Office at Boston as second-class matter.

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IN the Convention of the Western Association of Architects, held last month, the action of the American Institute in favor of accomplishing consolidation within a year, if possible, was cordially seconded, and a committee appointed to act with the corresponding committee of the Institute in preparing, within the next five months, a definite plan of consolidation, which, after approval by the Trustees of the Institute and the Directors of the Western Association, is to be submitted to the members of both bodies, and a ballot taken upon it by letter. If two-thirds of the members of both bodies vote in favor of it, the plan is to be forthwith adopted, the two bodies declared united under the name of the American Institute of Architects, and a call issued immediately for a convention, at which the business shall be the reorganization of the body now bearing that title, to conform to the new plan of consolidation. There seems to be little doubt that this programme will be carried out, and that the next year will see the complete formation of a new body, strong in its large membership, which, including the present Fellows of the Institute and members of the Western Association, will comprise nearly five hundred of the most conspicuous men in the profession, and ready, we may hope, for the work which will at once be placed upon it. Among the members of the Western Association, particularly, there seems to be a disposition, which is much to be encouraged, to call upon the new body for various services which it will be in a position to render effectively. For example, the question of the employment of clerks-of-works on all important buildings, which was one of the most serious matters to be considered at the recent convention, was immediately referred to the Consolidation Committee, with, apparently, the well-grounded idea that the united body could deal far better with it than any local association, however large. The same action was taken in regard to the proposed formation of State Defensive Leagues, which would certainly, advocated as they are most earnestly by many members of the Western Association, have taken up a good deal of the time of the convention if it had not been at once perceived that the new national body could do this work best. If the persons who have these or any other important movements at heart will be diligent in keeping them before the reorganized Institute, they will confer a double benefit upon the profession. It has long been a reproach to the Institute among the younger architects, and among many of the older ones also, that there was nothing to be gained by joining it, and men who contributed liberally in zeal and money to the local professional organizations have taken a certain pride in holding aloof from the general body, which, as they said, could do nothing for them but put their names on its membership list. To a certain, though small, extent this has been true. The Institute has not been powerful enough in numbers to exert a very great influence on the public, and it has necessarily and wisely been careful not to injure its influence by undertaking to speak too confidently for a profession of which its members formed so small a part. With a quadrupled membership, however, it can justly claim to represent the profession in something like an adequate manner, and, as its suggestions or remonstrances can no longer be met with the sneer that they proceed only from a small local body, it can offer them more boldly, and may be sure that attention will be paid to them. If its Council, for instance, should send a note to the Government of the Commonwealth of Massachusetts, pointing out that all its members had pledged themselves not to enter competitions where the execution of his design, at the usual fees, was not to be the reward of the one placed first by expert judges, and expressing a belief that seven weeks was too short a time to prepare designs for a State-House extension, that note would be read, instead of being thrown into the waste-basket, as would probably be one from the Trustees of the present Institute; and, if attention were not paid to its suggestions by the party in power in the Legislature, the opposing party would come to its aid with energy, in the hope of making a political point. A successful defence of professional principles by the new body in a few instances of this sort would soon attract new members, who would see substantial advantages in a relation which had previously, as they imagined, offered only an empty honor, and with membership influence would increase, and membership again with influence. Of course, hasty or ill-judged action may destroy the authority gained by slow and wise steps, but this is not to be expected from the experienced men who will control its affairs, and a prudent zeal for the interest of the profession will find ample opportunity for exercise for many years to come.

THE Commonwealth of Massachusetts shows a singular ignorance of architects' work by advertising for competitive plans for the extension of the State-House, and allowing until January 20, or about seven weeks, for the completion of the drawings. Three premiums are offered, of fifteen hundred, twelve hundred, and nine hundred dollars, which the Committee probably supposes to be liberal, and, indeed, they are too liberal for the sort of plans that are likely to be made in the allotted time. The problem is an excessively difficult one, the ground on which the extension is to stand being on the side of a steep hill, so that there will be many feet difference in level between the entrance-floor of the new and the old part, and seven weeks would be little enough time, even if an architect had nothing else to do, to devote to the plan alone, without thinking of the elevations, any one of which would need weeks for proper study. We trust that the matter will be reconsidered, and at least six months allowed. The Commonwealth of Massachusetts ought to be sensible enough to reflect that it is poor economy to spend two million dollars in carrying out a crude, ill-considered plan, and, if it is not, architects certainly are, and few of the better class will have anything to do with the competition on the published terms. To say nothing of the impossibility of doing anything creditable within the time allowed, as well as of the strong feeling in the profession against entering competitions for money prizes simply, there have been so many instances of pretended competitions for public buildings, where the offer of prizes for designs to be prepared in an unduly short time served merely as a cover for the award of the commission to some favored individual chosen long beforehand, that architects have learned that it is for their interest to avoid any contest not carried out according to the terms approved by the profession; and, although we are inclined to think that intentional fraud of this kind is less common than is generally supposed, and do not imagine for a moment that anything of the kind is to be imputed to the Legislative Committee of Massachusetts, there ought to be no reason why the Commonwealth should not have the service of the best men in the profession, which it certainly cannot get on the terms which it proposes.

THOSE persons who intend to take part in the Paris Exposition of 1889 must be getting ready. The buildings for the exhibition are nearly done, and some of the articles to be shown must soon be on the ground, to be sure of complete arrangement before May 5, the opening day. There is now no doubt that the affair will be extremely successful so far as the

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pleasure of the spectators is concerned, for applications have been received for most of the enormous space available, and many official exhibits will be made. The German Government is almost the only one which has declined to take part, but we understand that it does not forbid its subjects to show their goods, so that its own participation will not be much missed. One very interesting feature will be the exhibits from the South American States. As there is almost no commercial communication between this country and South America, we know much less of the extraordinary development of portions of the continent than the Europeans do, particularly the Italians, to whom Buenos Ayres has become almost what New York is to the Germans. The greatest of all the attractions of the show will, however, undoubtedly be the Eiffel tower, which is almost completed. The latest news about this is that M. Eiffel has sold the right to manage and utilize the tower, during the period of the concession, to a syndicate, of which the principal member is the Franco-Egyptian Bank. As, by the terms of the concession, the tower becomes the property of the Government in twenty years, M. Eiffel could not sell it outright, but, being, as he says, an engineer, and not a showman, he does not wish to be troubled with the details of attracting people into it and gathering their five-franc pieces for the next twenty years, so that he is probably as glad to dispose of his rights as the syndicate is to secure what seems to be so promising a piece of property.

THE English Institution of Mechanical Engineers has invited the American Society of Mechanical Engineers to hold a week's meeting in London next May, and has made promises of entertainment which are calculated to make architects envious. To begin with, an offer has been secured from the Inman Steamship Company to transport members of the Society for one hundred and ten dollars each for the round trip from New York to Liverpool and back, if all the members go from New York on the same steamer. Returning, round-trip tickets will be available for any steamer of the line during the remainder of the year. If the party going out numbers one hundred and fifty persons or more, the Company will reserve a steamer, either the "*City of Chester*" or the "*City of Richmond*," for its exclusive use, retaining for it the whole first cabin. On the arrival of the visitors in England, they are assured invitations from various scientific bodies in France and England to inspect works of interest, and the lines of railway from Liverpool to Paris have promised to convey the party as their guests by special trains, while private hospitality will be cordially extended. It is expected that this very kind and sincere invitation will be enlarged, as soon as the necessary arrangements can be made, to include the American Society of Civil Engineers and the Society of Mining Engineers, and in that case the party of one hundred and fifty is pretty sure to be made up.

SOME extraordinary science seems to have illuminated the recent meeting of the American Gaslight Association at Toronto, during a discussion upon the remedies to be applied in cases where persons were suffering from the inhalation of gas. It is not uncommon for the workmen of the gas-companies, in looking for leaks or digging up broken pipes, to be overcome by the gas, and, according to the accounts of the treatment to which they are subjected by the surrounding philanthropists, they seem to be fortunate if they escape with nothing more than a temporary loss of consciousness. One of the participants in the discussion had had the prudence to ask advice on the subject from a physician, who gave him a sensible set of rules, consisting mainly in directions to give the sufferer plenty of air and administer a little brandy and water, assisting respiration by artificial means if necessary. Another one had heard, also from a physician, that sweet oil might be administered with advantage, and had used this remedy in many cases with excellent results, which he attributed to the efficacy of the oil, when swallowed, in "lubricating the breathing apparatus," so that recovery followed rapidly. Another gentleman had had a somewhat different experience. On one occasion, when seven of his men were found insensible in a trench from an escape of gas, he had them carried into a purer atmosphere, sprinkled with water, and dosed with whiskey and water until they were sufficiently restored to eat, and then gave them apples. After they had devoured these, it was found that "the acid of the apples immediately started the gas out of their stomachs," and they were soon able to drink some coffee and walk home. A similar method of "starting the gas out of the stomachs" of his men with acids had been tried by a third member, who, however, used vinegar instead of the acid of apples. The fourth remedy mentioned was not an amateur device, but the prescription of a physician, who was said to have on two occasions treated men overcome with gas by injecting carbonate of ammonia. Whether this application was intended to "lubricate the breathing apparatus" or "to start the gas out of the stomach" we are not informed, but it is not surprising to hear that the patient was ill for eight or ten days afterward. A much-disputed point, that of the relative poisonous effects of coal and water gas, was touched upon by one of the speakers, who said that the effect of the inhalation of water-gas was "a very serious matter indeed," and "entirely different" from the effect of coal-gas. In his practice extra precautions were taken in dealing with water-gas, and men did not recover from the effect of inhaling it for some weeks.

SINCE the recent explosion of a petroleum vessel in Calais Harbor, experiments have been made to determine what proportion of petroleum vapors mixed with a given amount of air will form explosive compounds. In mixing ordinary illuminating-gas with air, it is found that one part of gas to eight of air gives the most violent explosion, and with the vapor of the volatile portions of petroleum nearly the same observation is made. With one part petroleum vapor to five of air no explosion takes place. With six parts of air there is a feeble explosion, and with from seven to nine parts a very violent one. With twelve parts of air the detonation is still violent, but with sixteen parts it becomes feeble, and with one part vapor to twenty of air there is ordinarily no explosion. The conclusion which the *Revue Industrielle* draws from these observations is that accumulations of stagnant air in petroleum ships are very dangerous, and it suggests further that if fires should occur in them, they might be advantageously treated by the method now used in oil refineries, where pipes and pumps are always ready for forcing water in at the bottom of the great tanks, while a siphon extends from the upper portion of the tank to a place of safety. If one of the tanks should take fire the pumps are started, and the water forced in from below raises the level of the oil, which begins to run off through the siphon. As the opening of the siphon is below the surface of the oil, the flames which rage above cannot get into it, and the unconsumed oil is drawn quietly away from within a few inches of a conflagration which the bravest firemen cannot face, until most of it is safely transferred to another receptacle, and the portion which is left in the original tank is so small that it is soon consumed, and the fire goes out for want of fuel.

A CURIOUS device for testing the dryness of walls is described in the *Wiener Bauindustrie-Zeitung*. The apparatus for the purpose consists simply in small sheets of gelatine, which are made by taking the sheet-gelatine of commerce, selecting the thinnest pieces, soaking them for a quarter of an hour in water until they are quite soft, spreading them out flat on a greased sheet of glass, and stretching them with the fingers until the folds and creases are smoothed out, and the whole made as thin and uniform as possible. The sheets are then thoroughly dried in the air, the edges, which are rough and uneven, are trimmed off, and the whole cut into pieces about two inches wide and four inches long, for use in testing. If kept flat in a dry place, these gelatine strips are very sensitive to moist air. If a wall is suspected of being damp, a strip is moved slowly over it near its surface, but not touching it. If any damp spots exist, they are immediately shown by the curling of the gelatine as it passes near them. Although every one takes some interest in knowing whether his house is dry or not, this simple test is likely to be of more practical use to fresco-painters and paper-hangers than to any one else. Both of these, to avoid disappointment and loss, need to know with certainty whether the walls and ceilings on which their art is to be exercised are dry or not, as their papers and colors will often change on damp plastering. In the case of a wall of masonry, particularly, plastered on the brickwork, it is difficult to tell by ordinary inspection whether the moisture has dried out or not, and the gelatine sheets may give the desired information with such certainty and precision as to be of great service.

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BUILDERS' HARDWARE.[1] — XV.

SASH-HOLDERS AND SPRINGS.

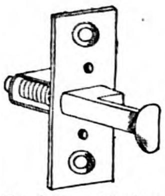

Fig. 216. Window spring. P. & F. Corbin.

THE sash-fasts which have been described up to this point, have been those intended for use in connection with double-hung windows; and, while any of them could be used with a window having double sashes which are simply set in the frame, without weights or balances of any description, there are a few appliances especially intended for windows without weights, which can best be considered in this connection. "Hammond's" window-springs are used so extensively for this purpose that they are almost standard. The springs are simply flat bands secured to the hanging-style and catching in ratchet cuts on the edge of the sash, each spring having a bent handle or thumb-piece coming out in front of the sash. One spring is used for each sash. A different form of spring is shown by Figure 216. This is mortised into the hanging-style and catches into square cuts on the edge of the sash, the thumb-piece showing in front. Figures 217 and 218 show two forms of window-springs on an entirely different principle. The portion containing the spring is mortised into the sash, the lever showing in front of the glass. In the first instance the spring is exposed, and catches on posts set in mortised plates at intervals on the hanging-style. In the latter example, the spring is concealed, the end of the lever hooking into plates of the shape shown by the figure, which are mortised into the hanging-style. These springs also serve as holders, the ends of the levers pressing strongly against the hanging-style and holding the sash from slipping.

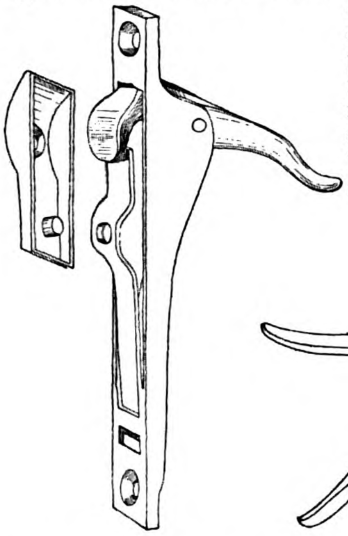

Fig. 217. Sweet's Window-spring. Stanley Works.

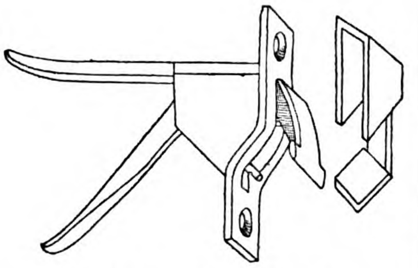

Fig. 218. Northrup's Window-spring. Stanley Works.

Fig. 219. Sash-roller. P. & F. Corbin.

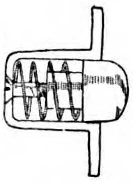

Fig. 220. Ayer's Sash-holder. Ayer's Sash-holder Co.

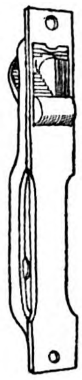

Fig. 221. Byam's Sash-balance Byam, Stewart & Baker.

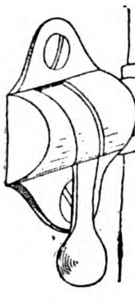

Fig. 222. Sash-fastener. Stoddard Lock & Mfg. Co.

A sash-holder is something intended to keep unweighted sashes in any given position by friction on the jambs of the frame. Besides the two previous forms, there is a very simple device consisting of a wooden or vulcanized-rubber roller, Figure 219, mortised into the sash and bearing against the window-frame. There is also the "Ayer" sash-holder, Figure 220, better adapted to its purpose than any wheel could be, consisting of a round peg mortised into the sash and pressed constantly against the hanging-style by means of a strong spiral spring. Still another form is shown by Figure 221. This is mortised into the hanging-style, and consists of a small wooden cylinder, or roll, laid loosely in a slot and against a heavily milled surface which prevents it from rolling down. The milled plate is backed by a heavy steel spring. When the sash is lifted, the roll turns easily in the slot; but, when the sash is being lowered, the wooden roll wedges between the milled-plate and the edge of the sash, offering a resistance in proportion to the stiffness of the spring.

Figure 222 illustrates an appliance which can be used as a sash-fastener, but which is intended more especially to bind the sash so it will not rattle. It consists of a plain bolt sliding in a case attached to the window, with a lever working in an oblique slot, so that when it is drawn down, the bolt is pressed out with considerable force, and holds by friction against the jamb. Figure 223 shows another anti-rattling device, a metal surface on the sash which wedges against an inclined plate on the jamb; and Figure 224 is the simplest of all, a metal wedge, suspended by a small chain attached to the sash, which can be inserted in the joint between the sash and the stop-bead.

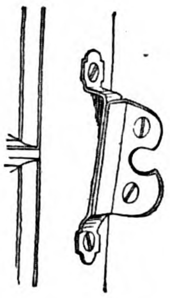

Fig. 223. Clauson's Anti-rattling Wedges. Sise, Gibson & Co.

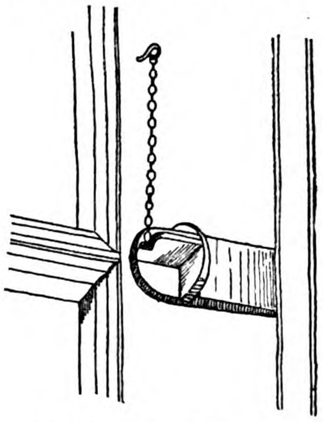

Fig. 224 Ideal Anti-rattler. American Mfg. Co.

The following table gives the average retail prices per dozen of the sash-fasts, etc., referred to in this chapter:

The prices are for plain goods, when such are manufactured.

TABLE OF SASH-FASTS, ETC.

Fig.	Name.	Bronzed Iron	Brass or Bronze.
181	Yale & Towne sash-lock	—	$12.00
182	King sash-lock	$2.50	
183	Sash-fast, P. & F. Corbin	1.00	2.50
184	Sash-fast, Russell & Erwin	1.35	6.60
185	Judd sash-fast	1.38	4.00
186	Sash-fast, Norwich Co	1.15	3.30
187	Sash-fast, P. & F. Corbin	—	6.00
188	Metropolitan sash-fast	3.00	7.50
189	Boston pattern sash-fast	1.50	6.00[1]
—	Ladd sash-fast	2.30	7.00
190	Sash-fast, Hopkins & Dickinson	1.60	5.00
191	Sash-fast, Stoddard	1.00	4.50
192	Favorite sash-fast	1.00	3.50
193	Sash-fast, Yale & Towne	—	6.00
194	Morris sash-fast	1.68	4.20
195	Triumph sash-fast	1.68	4.20
196	Sash-fast, P. & F. Corbin	.88	—
197	Mathes's sash-fast	1.50	3.70
198	Payson's sash-fast	1.00	4.00
199	Ives' sash-fast	1.00	3.50
200	Sash-fast, P. & F. Corbin	.60	2.50
201	Ticket-office sash-fast	—	6.00
202	Robinson's sash-fast	—	6.00
—	Security sash-fast	—	3.75
203	Shaw's sash-fast	—	5.00[2]
204	Davis sash-fast	3.60	5.85
205	Byam's sash-fast	1.00[5]	4.20
207	Timby sash-fast		1.00[6]
208	Atwell sash-fast	3.00	6.00[2]
209	Brown's window-lock	.60	.75[2]
210	Eccentric sash-fast	.12	—
211	Sash-lock	.33	—
—	Hammond's sash-springs	.70[4]	—
216	Window-spring, P. & F. Corbin		.58
217	Sweet's window-spring	1.25[3]	
218	Northrup's window-spring	1.25[3]	
220	Ayers' sash-holder		
221	Byam's sash-balance	7.20[3]	
223	Clauson's anti-rattler, per set	—	.18
224	Ideal anti-rattler	—	.60

[1] Price in Bower-Barffed iron, Yale & Towne Mfg. Co., same as in bronze.
[2] Nickel plated.
[3] Plain iron only.
[4] Japanned iron with silver-plated knobs.
[5] Japanned iron.
Face-plate only of bronze.

[1] Continued from page 266, No. 676.

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There is also a very satisfactory and simple device consisting of a plain, hard-rubber button with a milled edge which is screwed on to the bead and against the sash, so as to turn when the window is opened. This is known as "Patten's" window-tightener. It is manufactured by the Portsmouth Wrench Company, and retails at 4 and 5 cents per hundred. The same, or a much similar form, is manufactured by the Ayer's Patent Sash-Holder Company.

"Nelson's Perfect Fastener," is a name applied to a device for screwing the stop-bead to the window-frame; it consists of metal eyelets which are sunk into the bead, with an ecliptical instead of round hole to receive the screw. As the longest dimension of the screw hole is in a horizontal direction, the bead can be set so as to permit of a play of quite a quarter of an inch. Such a contrivance must prove a boon to those who are suffering with windows which bind in summer and rattle in winter. The fasteners cost from $2 to $3.25 per gross, including either round or flat headed screws.

SASH-LIFTS.

Sash-lifts are often omitted from architects' specifications, though they are usually very desirable, and when properly applied, will save a great deal of wear on the sash. The common form of lift is shown by Figure 225. A form which is not quite as convenient to use, though sometimes preferred, is the flush lift, the type of which is similar in the

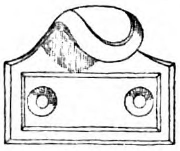

Fig. 225. Ordinary Sash-lift.

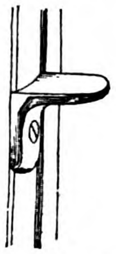

Fig. 226. Byam's Sash-lifter. Byam, Stewart & Baker.

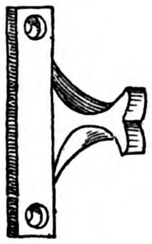

Fig. 227. Sweet's Reversible Sash-lift. Stanley Works.

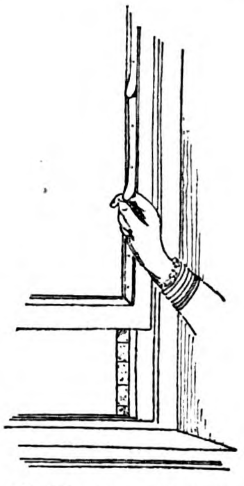

Fig. 228. Wigger's Sash-lifters. Brainerd & Co.

main to Figure 225. Both of these are intended to be attached to the bottom-rail of the lower sash. Figure 226 is a species of sash-lift which is applied over the mouldings of the sash-styles, in the shape of a concave strip of metal, with shoulders

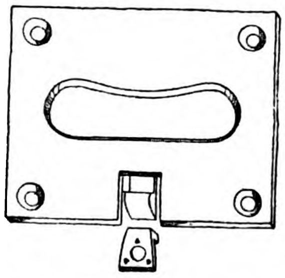

Fig. 229. Flush Sash lift and Lock. Ireland Mfg. Co.

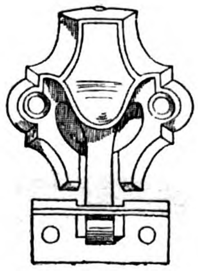

Fig. 230. Sash lift and Lock. Ireland Mfg. Co.

at intervals. Figure 227 is in the form of an angle-iron, likewise secured to the sash mouldings, and Figure 228 shows a form which can be applied either over the mouldings or on the face of the sash.

Figures 229, 230, 231 and 232 show four styles of combined sash lift and lock. No. 231 works by gravity. The others are each fitted with a spring which forces out the catch so that it will hold on the sill-plate or catch. Figure 233 shows a very practical form of sash-lift so arranged that by pressing down the lever handle a great lifting power can be applied, sufficient to start and lift a heavy sash, or to start a sash that has become wedged or frozen in. After the sash is started, the lift is in the right position to raise it with ease, and when the window is closed the lift can serve as a lock, by turning a button which will prevent the lever handle from moving.

Figure 234 shows two of the common forms of casement or

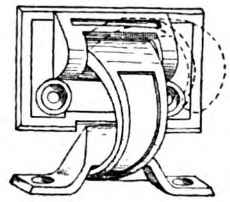

Fig. 231. Sash lift and Lock. Russell & Erwin.

Fig. 232. Sash lift and Lock. P. & F. Corbin.

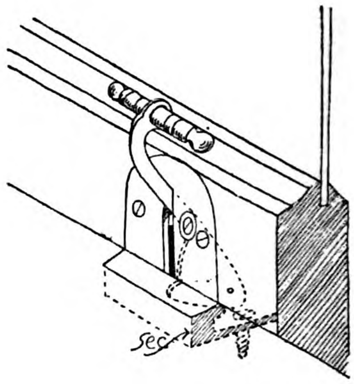

Fig. 233. Anderson Sash-starter.

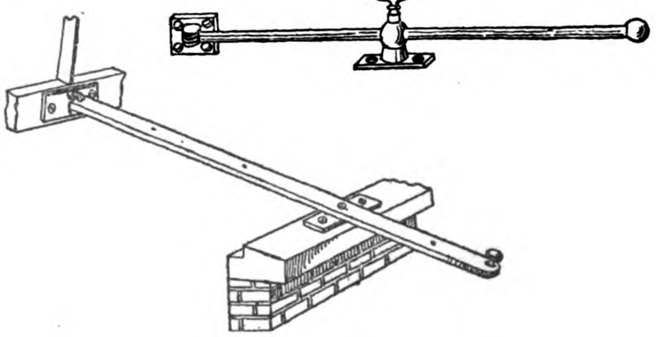

Fig. 234. Sash-openers.

hinged sash-openers. These are best made to order, but can be had in stock, 12, 15 and 18 inches long, and cost from 50 cents to $1 each, depending on the metal and the finish.

TABLE OF SASH-LIFTS.—AVERAGE RETAIL PRICES PER DOZEN.

Fig.	Name.	Bronzed or Japanned.	Brass or Bronze.
225	Common sash-lift	$ .30	$1.35
	Flush sash-lift	—	2.00
226	Byam's sash-lift	.30	.90
227	Sweet's sash-lift	.25	—
228	Wiggers's sash-lifts	1.50	2.25
229	Sash lift and lock, Ireland Mfg. Co	2.70	4.80
230	Sash lift and lock, Ireland Mfg. Co	2.10	4.20
231	Sash lift and lock, Russell & Erwin	1.00	4.00
232	Sash lift and lock, P. & F. Corbin	.80	3.20
233	Anderson's sash-starter	6.00	9.00

[To be continued.]

THE DANGEROUS THEATRE CHANDELIER.—At last somebody has been killed by one of the swords of Damocles, in the shape of huge and tottering chandeliers, which theatrical managers insist on hanging over the heads of their audience. The glass drop descended on a gentleman in the stalls at the Paris Lyrique theatre and killed him on the spot. The audience, however, were not upset by the incident. They had paid their money and they insisted on seeing the play out. *Si fractus illabatur orbis, Impavidum ferient ruinæ,* which may be translated (for this occasion only): "If the globe of the chandelier breaks to pieces on somebody else's head, you bear the smash without a shiver."—*St. James's Gazette.*

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THE HITTITE REMAINS.

IN the year 1879 the mounds of Jerablous, on the Euphrates, six hours below Biridjik, were identified by Mr. Henderson, the English Counsel at Aleppo, as the site of "Carchemish," the capital of the ancient but long-lost nation of the Hittites. Soon afterwards the American missionaries visited those mounds and examined them with deep interest, and as they toured through their mission fields from time to time, they scrutinized every fragment of chiselled stone in search of Hittite sculptures and inscriptions.

Two lions of black basalt were found on the top of the wall of the old Genoese Castle, in the city of Marash, guarding the entrance. Their workmanship was so unlike the other ornamentations of the wall, that it was but natural to infer that they were made for some other purpose.

One of them was covered with hieroglyphics in the same character as those at Carchemish. They were found also to be identical with the mysterious writing on the Hamath blocks in the museum at Constantinople. The inscriptions are in raised characters, arranged in horizontal bands, four inches wide, extending from left to right and then right to left, with a raised line separating the bands from each other.

Among the characters appear the heads of men, oxen, goats, hares and other animals, human hands, feet and faces with rings in the lips, and many other similar figures and others still, which, in their present form, do not seem to represent any natural object. The smaller characters are written one above another between the lines, but the larger forms extend nearly from line to line.

The faces and feet on the first band all look toward the right, but on the second they look toward the left and continue alternately in the same order, indicating the direction in which the writing must be read. These inscriptions bear very little resemblance to any known system of writing, and no attempt to decipher their meaning has thus far been successful.

Near the base of the fort was found the colossal trunk of a human statue or an idol, which must have been nearly eight feet in height. The head and both feet have been broken off. This large trunk now serves as a step in the stairway of a mosque.

On a grave in the Christian cemetery was found a slab of black basalt, four feet in length, two in width and one in thickness. The upper surface only had been trimmed, and contained in bas-relief a human figure dressed in a long tunic fastened by a girdle. In the hand was a wand or staff. The beard resembled that of the Assyrian sculptures, but the hair was long and gathered at the back of the neck in a peculiar roll turned upward. The shoes were painted and turned up at the toes. These peculiarities are characteristic of nearly all Hittite sculptures.

This slab also contained an inscription covering its entire face, the bands of hieroglyphics extending back and forth across the human figure, but the characters differ from others in being incised instead of in relief. They were, however, much defaced. Fifteen to twenty other slabs of the same general character have been discovered in Marash. One is the door-step of a minaret, another is in the pavement of a door-yard, another still, containing the figure of part of a chariot, serves as a horse-block at a street door. One heavy slab was found lying on its face four feet under ground in a vineyard, on which was represented two human figures sitting in chairs on either side of a cross-legged table, on which were plates of bread and fowl. These slabs are all of black basalt, having only one face of the stone trimmed; the figures are in bas-relief and the inscriptions all in the same characters, though there is variety of form corresponding to the hand-writing of different men or possibly of different times.

The lion on the fort has recently been transferred to the Royal Museum, Constantinople, and two or three small slabs have been carried away by European travellers. Others remain where they were discovered.

The lions on the fort, the trunk of the idol, and several other blocks near its base suggest that the natural mound on which the fort was built may once have been crowned with a Hittite palace or temple, and a block found on the side of the mound — perhaps a piece of an altar containing on two sides a beautifully cut inscription, but charred and cracked by heat — bears silent testimony to the method by which the building was destroyed. There seems abundant evidence that Marash was an important Hittite city, and many relics of its ancient buildings doubtless lie buried under the present streets and walls. Several interesting Hittite slabs have been discovered in the Albustan plain, eighty miles north of Marash; also a fine inscription near Room Kala, sixty miles east on the Euphrates.

Other blocks with the peculiar chiselling of the Hittites have been found in different places on the plains from twenty to fifty miles south of Marash.

It is well known that the plains of Central Turkey are scattered over with mysterious mounds of earth. They are of different sizes, but generally covering from two to four acres and are fifty to seventy-five feet in height, with a level acre on the summit. They are seen only on the plains, in all cases several miles from each other and in nearly every instance close by a fountain of water. Some suppose they were watch-towers, others that they supplied the place of a fort, the people gathering on the summit to defend themselves from the attacks of horsemen who could not ascend the steep sides; still others hold that they are monuments over the tombs of buried kings, while there are not wanting those who think that they are merely natural formations; but the fragments of pottery and the alluvial soil that compose them prove their human origin.

In modern times a rude Turkish village often appears at the base and part of the way up the side of a mound; in other cases the whole mound is covered with a vineyard or a wheat field, or its steep sides are perforated with the dens of foxes and jackals.

No light is to be found concerning them in written history, except in the Assyrian department of the British Museum, where, upon an immense block of stone, the representation of a multitude of men actually engaged in building such a mound may be seen. Some of these mounds, which are very regular, may have been built for a special purpose now uncertain, but others, irregular in form and larger in area, must have been formed by the débris of mud walls and roofs.

One of this latter class of mounds on the plain near the eastern base of the Amanus Mountains, about fifty miles south of Marash, has attracted the attention of the American missionaries for some years, and at their suggestion several travellers have visited it. The little Turkish village of Zenjirli is built on the side of a mound.

The special interest connected with it was a dozen slabs of black basalt four feet high and two feet square, at the ends forming a re-entrant angle at one edge of the mound near the base and apparently extending farther in towards the centre to complete the basement walls of a building. On the face of each block were Hittite bas-reliefs.

The attention of American antiquarians was called to this mound, and it was hoped that American enterprise would undertake its exploration. The past winter a party of Germans, under the patronage of their Government, have commenced the work of excavation, and one hundred laborers in a few weeks' time laid bare a large number of blocks forming, as had been supposed, the basement of a Hittite palace. They were nearly all *in situ*, resting upon rude foundations of masonry. A line of blocks extends along the entire front, then opens mid-way into an entrance-hall, which soon widens into a court about forty feet square. A narrow hall connects this court with another large court farther within, which has been uncovered only in part, but seems to be several rods square. These halls and courts are lined by a single row of basalt blocks, each standing on end and nearly every block contains on its inner surface a Hittite sculpture.

At one place is a hunting scene continued along a dozen blocks. The men are armed with daggers, spears, and the bow and arrow. Deer, rabbits and birds represent a variety of game. At the entrance to the main court on either side are the bas-relief sculptures of an immense lion looking toward the outer door, and behind each lion stands a heavily-armed soldier. The superstructure, resting upon these Hittite blocks, must have been made of sun-dried brick and perhaps in part of wood. The stones bear evidence that the buildings above them were burned. The pile of earth that forms the mound must be the débris of mud roofs and walls from Hittite palaces to the peasant hovels of modern times.

No Hittite hieroglyphics have yet been discovered, but the most remarkable "find" is the colossal statue of Sardanapalus, King of Nineveh, eighth century, B. C., standing on a pedestal in the smaller court of the palace. The workmanship is very fine. The face speaks like the finest Grecian statues. The statue had been thrown down and broken, but the fragments are all there and the whole figure can easily be restored. On this statue were several square yards of Assyrian inscription in cuneiform hieroglyphics, from which the name was determined.

But how this statue of an Assyrian king came to be placed in a Hittite palace is not easily accounted for. It is presumed that when Sardanapalus made his expedition through Asia Minor he conquered this Hittite city and erected his own statue in the centre of the palace, carefully preserving intact all the productions of Hittite art.

Several shafts have been sunk in different parts of the mound, but thus far no other important results have been reached. A few feet below the surface in various places were found the rude foundations of mediæval and Roman peasant huts with stone hand-mills, mortars, jars and other relics of those periods. One shaft reaching to the level of the plain disclosed a colossal image of an animal designed for a lion, but its rude workmanship belongs to an early period in the art of sculpture. There are traces also of a wall and moat a few rods distant inclosing the mound. Opposite the entrance to the palace a dozen sculptured blocks have been uncovered. They mark the gate-way in the city wall.

The Germans propose to continue their excavations three years and turn over with the spade the entire mound.

The great desideratum in Hittite discoveries is a bilingual inscription to be used as a key to interpret the mysterious hiero-

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glyphics. Nothing of the kind has yet appeared, except a very brief inscription on a silver boss, which a few years ago was offered for sale in Constantinople and fortunately copied, but the original has mysteriously disappeared. The languages were Hittite and Assyrian cuneiform, giving the name of a king and of his country, but both were unknown to history.

The Germans have also discovered in a Turkish cemetery near Zenjirli a human statue with nearly a square yard of inscription in what seems to be Phœnician characters.

Hittite remains have been discovered at different points in Central and Southern Asia Minor extending as far west as Smyrna and east to the Euphrates. Bible history also speaks of these people at Hebron, in Southern Palestine. They are not only many times mentioned in the Assyrian inscriptions exhumed from the mounds of Koyounjuk and Khorsabad at Nineveh, but also the mightiest of the Pharaohs of Egypt, when to glorify themselves they delineated their personal achievements upon the lofty pylons at the entrances of their temples, could find no prouder record of their valor than the representations of their victories over the Hittites. Rameses II, at Karnak and at the Rameseum, thus not only records his own brilliant victories, but undesignedly bears testimony to the strength and courage of those whom he calls "the despised Hittites," whose power he overcame with so much difficulty. It is an interesting fact that the treaty of peace between the Hittites and the Egyptians is engraved upon a stone tablet in the walls of Karnak, and is the first treaty of peace on record. The Hittites were known at Jerusalem, Thebes and Nineveh for the period of one thousand years.

This mysterious nation has now been lost to history for twenty-five hundred years, and it is very remarkable that all traces of its existence, except the few brief references in the Bible, are inscribed on tablets of stone. These people chiselled their bas-reliefs and hieroglyphics upon black basalt, even the most durable stone in the land, and in the destruction of the temples and palaces these precious slabs were buried deep under mounds of earth and kept for distant ages more safely than they could have been in any museum or library. The enemy did not take in all this when he threw his fire-brand into the palace halls.

It is not surprising that these mementos of such a lost nation, as they come to light one by one, should awaken a deep interest in the civilized world.

The experiment at Zenjirli suggests possibilities of the deepest moment. Hundreds of similar mounds in southern Asia Minor and in Mesopotamia are waiting for the spade to reveal their treasures. They may not all contain the ruins of palaces, temples, stone libraries, or works of art, but it is a remarkable fact that the first mound opened in Central Turkey contained a genuine palace, a statue of a king of Nineveh with an extensive Assyrian inscription, and also nearly or quite as many works of Hittite art as all others that have hitherto been discovered.

There is here surely a wide and intensely interesting field for investigation. The American missionaries, the only Americans on the ground, have neither the time nor the means to prosecute such enterprises, but it is earnestly desired that the American people assume a share in the search for the records of this long-lost nation.

ERHARD BISSINGER, *U. S. Consul.*

BEIRUT, September 22, 1888.

THE ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

HOUSE OF HENRY H. COOK, ESQ., COR. 78TH ST., AND FIFTH AVE. NEW YORK, N. Y. MR. W. WHEELER SMITH, ARCHITECT, NEW YORK, N. Y.

[Gelatine print, issued only with the Imperial Edition.]

HOUSE OF GEORGE COMSTOCK, ESQ., BRIDGEPORT, CONN. MR. J. W. NORTHROP, ARCHITECT, BRIDGEPORT, CONN.

THIS is a frame building, the exterior shingled and clapboarded; roof slated. The interior is finished in natural woods, the first story in oak, mahogany and cherry, the second story in white wood. The house is heated by indirect steam. Cost a little above $10,000.

ETCHINGS BY MR. JOSEPH PENNELL.—CHANCERY LANE, PHILADELPHIA, PA.; AN ALLEYWAY, PHILADELPHIA, PA.; THE LANDING-PLACE, LEGHORN, ITALY.

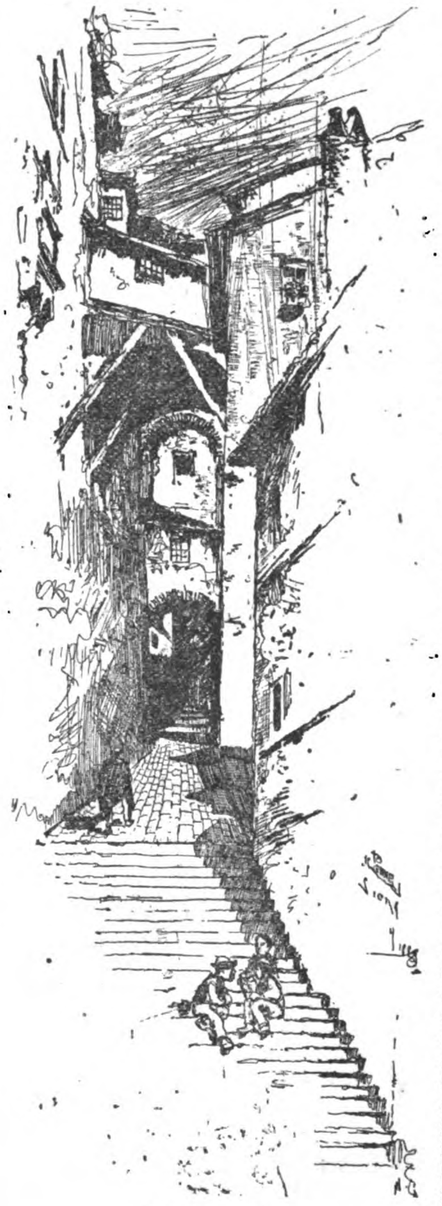
SEE article elsewhere in this issue.

VIEWS AT WISBY, SWEDEN.

WISBY is the capital of the Island of Gottland.

HOUSE OF C. F. LOUDON, ESQ., AVONDALE, O. MR. S. E. DES JARDINS, ARCHITECT, CINCINNATI, O.

JOSEPH PENNELL, ETCHER AND ILLUSTRATOR.


A Sienese Street.

WHETHER there is a cause for it to be found in the traditional sobriety of tone characterizing the old Quaker City, I know not, but Philadelphia is, undoubtedly, the home of a remarkably large number of distinguished artists in "black and white." Among her sons and daughters, native or adopted, are, or have been, for death, alas! has claimed some, such illustrators as James Hamilton, H. L. Stephens, Darley, Abbey, Frost, F. B. Schell and E. B. Bensell; such etchers as Parrish, Thomas Moran and his wife, Mrs. Mary Nimmo Moran, Peter Moran and his wife, Mrs. Emily Moran, S. J. Ferris and his son Gerome Ferris, William Sartain, Mrs. Anna Lea Merritt, Miss Edith Loring Peirce (now Mrs. Getchell), Miss Gabrielle Clements, Miss Blanche Dillaye and Miss Mary Cassatt, with others; and such steel-engravers as Longacre, Alexander Lawson, Hinshelwood, Whitechurch, the veteran John Sartain, his son Samuel and his daughter Emily. The frequency of feminine names in these lists is significant, and one more can be added, that of Miss Alice Barber, who is both wood-engraver and designer. Another Philadelphian, able to charm without the aid of color, was William H. Furness, whose refined crayon portraits are treasured in many a home.

Mr. Joseph Pennell has already made a distinct and valuable addition to the sum of monochromatic art achieved by the artists noted in my hasty and, doubtless, incomplete survey, and his youth warrants us in expecting much more. Born in Philadelphia thirty years ago, he studied at the Pennsylvania Academy of Fine Arts, the oldest institution of the kind in the United States. Beyond this, he does not appear to have received any regular instruction, but worked from Nature, aided by experience—expensive but most impressive taskmaster—and so far as the technicalities of etching are concerned, gathered them from the treatises of Hamerton and Lalanne. At first Mr. Pennell etched both out-of-doors and from sketches, but, I believe, that he has long since abandoned the latter method, and now works only directly from nature on the plate. His earliest etchings date from 1880 or 1881, and were reproductions of quaint old bits of his native city. These were followed by some etchings of scenes in New Orleans; and, then, in 1883, he went abroad, where he still remains. It was towards Florence that he first turned his steps, and some of his best plates were done there, the "Swing of the Arno" and other presentments of the river, with its bridges, and the roofs and streets of the city of Dante, of Savonarola and of Michael Angelo. These were supplemented by etchings done at Siena, at

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Pistoja, at Venice and other Italian cities, which complete the tale of his published plates, except one or two done for the *Portfolio*, in all about forty-five. Of late Mr. Pennell's time has been absorbed in illustrative work, but we shall hope to see some new etchings from his needle before long. The prime qualities of his etched work are freedom and beauty of line. His prints are full of vivacity and force, and as far as can be from the labored and conventional, and warrant us in placing their author with the foremost of our etchers — one of that brilliant group of young artists who are fast raising American etching to a place alongside of American wood-engraving. The high quality of Mr. Pennell's work was early recognized in England, where he was elected a member of the London Society of Painter-Etchers. He also belongs to the Philadelphia Society of Etchers and to the New York Etching Club.

Concerning the etchings which are here reproduced by the kind permission of Mr. Pennell and his publishers, Messrs. F. Keppel & Co., of New York, I should mention that the "Chancery Lane" is photographed from a "clean-wiped" proof.

Mr. Pennell's work as an illustrator — and it is of great extent — has been done mainly for the *Century* magazine and comprises what I suppose may be considered as his most serious and important undertaking thus far. I mean his illustrations to Mrs. Van Rensselaer's series of papers upon English cathedrals — Durham and Salisbury and the rest of those rich architectural jewels in the churchly crown of Albion — and I think it would not be easy to say more in their praise than that here the artist is worthy of the author. The admirable style of one well accompanies and gives the last touch to the work of the other. The drawings, which are deserving of the closest attention and which show that Mr. Pennell handles brush or pen with equal facility and success, have detained the artist in England for several years. One of the chief charms in his illustrations is their unfailing picturesqueness. This everybody can see, but not all will appreciate the admirable use of the pen in the line-drawings, which make up by far the greater part of his work, or notice how very few strokes are wasted or uncalled for. At times it almost seems as if more could have been used with better effect, but a second inspection will show this to be doubtful and every line added would tend to weaken their fascinating suggestiveness. Mr. Pennell always has a firm hold of the character and spirit of the subject he draws and others may render it more elaborately (often a difficult task) if they will. He has distilled into printer's ink the essences of many places — gloomy monasteries of the Order of the Solitary in Pennsylvania, those strange reminders of one of the most curious of the many faiths that have found a footing in this wonderful country of ours; old taverns and tumbledown-houses, crumbling away from age and the march of improvement, which shamefacedly huddle together in some of the back streets of the city of William Penn; ancient New Orleans with its reminiscences of the rule of Bienville, its Place D'Armes and Cathedral and its Creole houses; Tuscan and other Italian cities — "fair Florence," "pitiless Pisa," "industrious Lucca," Siena, Pistoja, Prato and Fiesole, ducal Urbino, fierce Rimini, Venice and Rome; the Four Courts and Sackville Street, St. Patrick's Cathedral and the Phœnix Park of Dublin on the Liffey, and the "reverend walls" and "college fanes" of Oxford

> "Massy piles of old munificence
> At once the pride of learning and defence";

the smoke and grime of many-chimneyed Sheffield, and the bridges, the towns, the châteaux and the island of the Saône. His latest published work in illustration is a number of drawings of London, which embellish even the brilliant text of Henry James. Mr. Pennell has been fortunate, indeed, in being chosen to illustrate the travel-essays of writers like James, Howells, Cable, Hamerton and Vernon Lee.

One of the earliest papers in the *Century*, for which he furnished drawings was "A Ramble in Old Philadelphia" written by Miss Elizabeth Robins, a niece of Charles G. Leland. The artist had accompanied the author and her uncle in their walk and since the lady became Mrs. Pennell they have travelled many long miles together. Mrs. Elizabeth Robins Pennell is now well-known as a writer, especially in the magazines, and has written a life of "Mary Wollstonecraft" for the Famous Women series. Both she and her husband have made tricycle tours on the Continent, and French and Italian peasants have stopped their work in the fields at the sight of a lady sitting on a "sociable" in front of a rather tall gentleman in a Scotch cap "coasting" merrily down hill or wearily climbing another in the rain. As Mr. Charles G. Leland says in his amusing rhymed apology which prefaces the "*Two Pilgrims Progress:*"

> "He who with her a Pilgriming did go, —
> That was her Husband. As this Book doth show,
> Rare skill he had when he would Sketches take,
> And from these Sketches pritte Pictures make."

That tricycling, like life, is full of ups and downs and yet has its fair and level spaces, is shown in the charming little records of these trips which, written by Mrs. Pennell and illustrated by her worser-half, have been published within the last few years. The names of these bright and dainty little books — I hope we shall see many more such — are "*A Canterbury Pilgrimage,*" "*Two Pilgrims Progress*" (from Florence to Rome), and "*Our Sentimental Journey through France and Italy.*" The first recalls Chaucer, the second Bunyan, the third Sterne and the last joint-work of this clever pair reminds us of Dr. Johnson. It is a sketch of a (walking) tour to the Hebrides and contains some of Mr. Pennell's best drawings. But no need to say more of it as every one has enjoyed it in the pages of *Harper's*. William Black, though he has shown disapprobation of some opinions expressed in the Hebridean series, does not withhold praise of Mr. Pennell's drawings of the places so closely identified with his stories.

A happy fancy it was that associated these pleasant journeyings with those of other famous travellers (not all of whom, however, voyaged in the flesh) and shows us Oban and Iona, Calais, Montreuil and Nampont, and the gray old Cathedral town as they are in this decade, and not as they were in the days of Boswell, of Dessein's Hotel and Yorick's grisette, and of the gentle "nonne" and the "younge squire."

WALTER ROWLANDS.

MEDIÆVAL HOUSES.[1] — VIII.

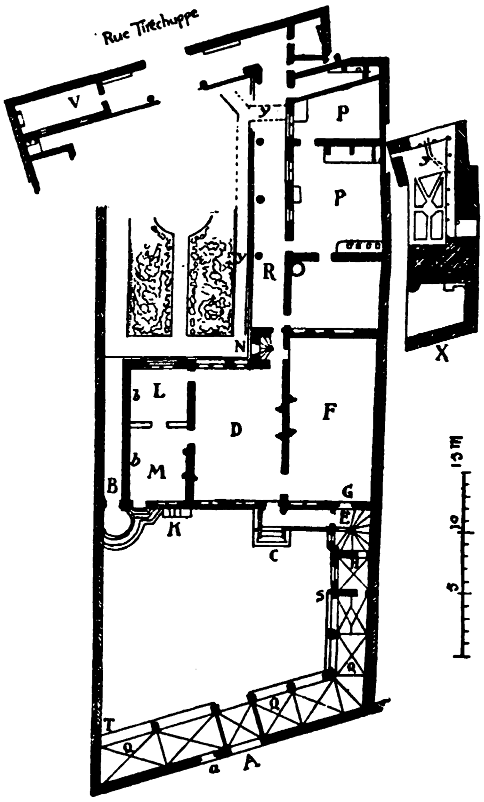

Fig. 36.

ONE of the most charming hotels of the later days of the fifteenth century, which was so rich in buildings of this class, was La Trémoille, which still stood in 1840 in the Rue des Bourdonnais. This was a regular fief, created at Paris under Charles VI, and proceeding directly from the King — later, from the Bishop. It was rebuilt as we see it about 1490, by Louis de la Trémoille, who was born in 1460. It was this Louis de la Trémoille who captured the Duke of Orleans at the battle of Saint-Aubin-du-Cormier in 1488, which did not prevent the Valois, become king of France, from conferring upon him the command of the army of the Milanais in 1500. He was killed at the battle of Pavia.

Figure 36 is the ground-floor plan of this hotel. The entrance-door, *A*, and the postern, *a*, opened on the Rue des Bourdonnais, and gave entrance into a spacious court. From the entrance, a portico led to the buildings. To the left, under a tower carried on two columns, was a passageway, *B*, putting the court into communication with a garden which extended back to the Rue Tirechappe, and had a common gate on the left, and one on the right for equipages and horses. A broad stair, *C*, led to the grand *salon*, *D*, into the principal staircase, *E*, into the *salon F*, by the door, *G*, and into the little arched room, *H*, by the descent of a few steps. Underneath were the well-arched and spacious cellars. Another door, *I*, with stairs and a horse-block, *K*, gave direct entrance from the court into the two rooms, *M* and *L*. A second staircase, *N*, ascended to the upper stories and the roof. At *O* was a little court with wells. The kitchens and their adjuncts were at *P*. They were in great part destroyed and enclosed in a neighboring property. A portico, *R*, extends to the entrance portico on the Rue Tirechappe, giving also a covered way from the kitchen and servants' quarters to the principal apartments and, by crossing a lower landing of the common staircase, to the dining-hall, *D*. The *conciergerie* was placed on the Rue Tirechappe at *V*. At *Y* a well-constructed sewer was found, which formerly collected and carried rain-water under the street. In the first story, the arrangement of the large apartments was the same as that of the ground-floor; the partition wall *b*, was, however, left out, thus enlarging the rooms *L* and *M*, of which the latter opened into an oratory or study in the tower.

The portico *A*, extending on the first floor between the points *S* and *T*, was well lighted on the court, but had only three small windows on the street. The large single apartment between the court and the garden on the second floor was reached by the two

[1] Translated from the French of Viollet-le-Duc, by Mr. A. B. Bibb. Continued from page 271, No. 676.

staircases *E* and *N*. The kitchen-buildings, servants' quarters, and the portico *R* were not carried above the ground-floor. At *X* is a general view of the Hôtel Trémoille, with the garden and the servants' offices and quarters. The architecture of this hôtel was one of the most beautiful creations of the latter part of the fifteenth century. The left tower, the great staircase, and the porticos, with their upper story, had suffered very slight mutilations. The front

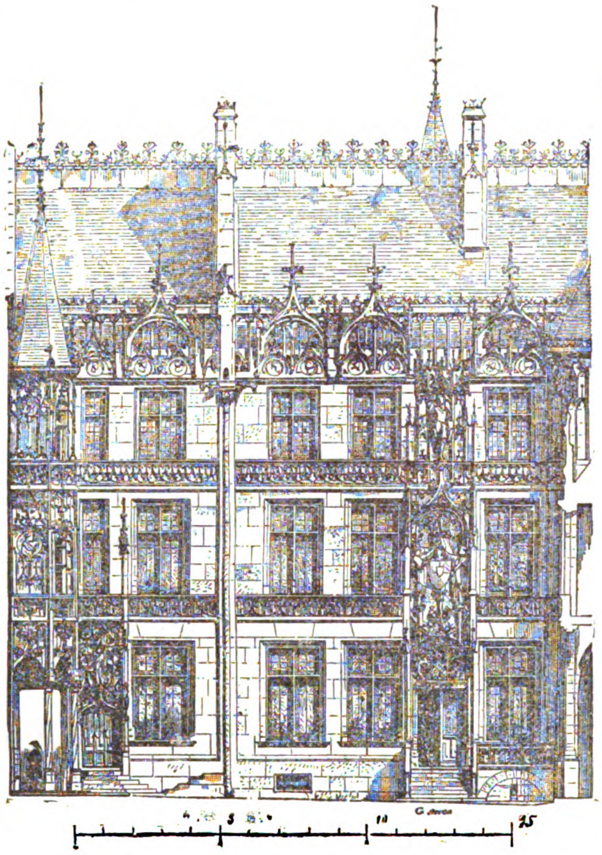

Fig. 37.

of the apartments on the court had been much damaged, but the principal decorations were preserved in fragments under the modern plastering. On the garden side the front was very simple. The most admirable thing about this charming bit of architecture was the delicate taste of the artist. The mingling of plain and decorated surfaces was most happy. The hôtel was demolished in 1840. Conjointly with the Historical Monument Commission, I made at the time the most pressing appeals for the preservation of this masterpiece. We gained, however, only the privilege of carrying off several fragments to the Ecole des Beaux-Arts, where they are still to be seen, set in the wall on the left of the entrance. At Figure 37 is the façade of the great rooms between the tower and the staircase.

All the world knows the Hôtel de Cluny, which is built over the thermal baths of Julian, and contains to-day the Museum of Mediæval Relics. This edifice is of the same epoch as the Hôtel de la Trémoille, and shows a similar arrangement. On the Rue des Mathurin rises a plain battlemented wall, and the buildings are between the court and the garden. We quote from the Baron Guilhermy this summary of the history of Hôtel Cluny: "In the first half of the fourteenth century, about 1340, Pierre de Chaslus, Abbé of Cluny, bought the site of the Palais des Thermes, with the intention of building a dwelling near the college of his abbey, opposite the Sorbonne. This project does not seem to have been carried out, and it was not until the end of the fifteenth century that Jean de Bourbon, one of the successors of Pierre de Chaslus, began the construction of the edifice, which still exists. When this prelate died, the foundations were hardly above the earth. Jacques D'Amboise, who united at the same time the titles of Bishop of Clermont, Abbé of Cluny, Abbé of Jumiéges and Abbé of Saint-Alyre, restored in 1490 the work of his predecessor, and conducted it to entire completion." More fortunate than the Hôtel de la Trémoille, the Hôtel Cluny was preserved, thanks to the collection which Dusommerard placed there, and to the reputation which this collection of mediæval objects soon acquired throughout Europe. In 1842, the Government bought the hôtel and the collection which it contained, and ceded it, with the rest of the Baths of Julian, to the city of Paris, and to-day the Museum is the Mecca of the mediævalist.

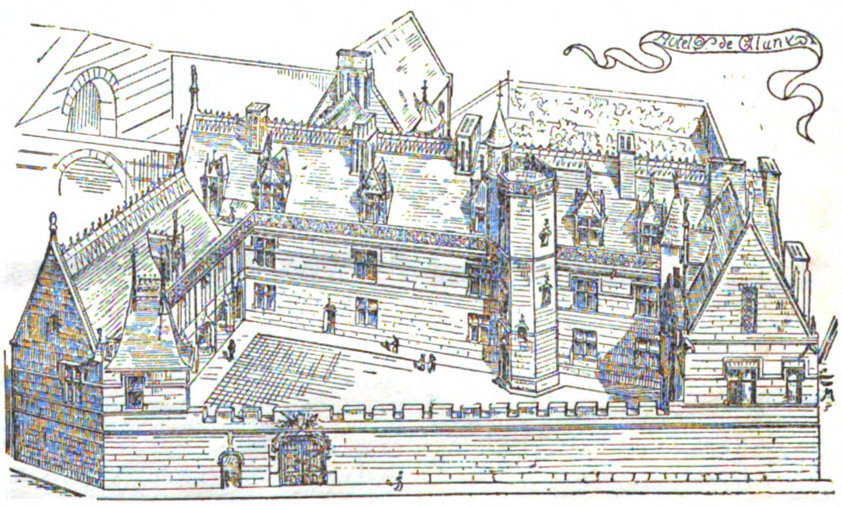

Fig. 39.

At Figure 38 is the ground-floor plan of this hôtel. The apartments are larger than those of the Hôtel de la Trémoille, but the garden is not so extensive. At *A* is the principal door on the Rue Mathurin-Saint-Jacques, with its postern, A'. The porter's lodge is at *B*; farther on is a portico, *C*, which gives entrance into the rooms, *H*,

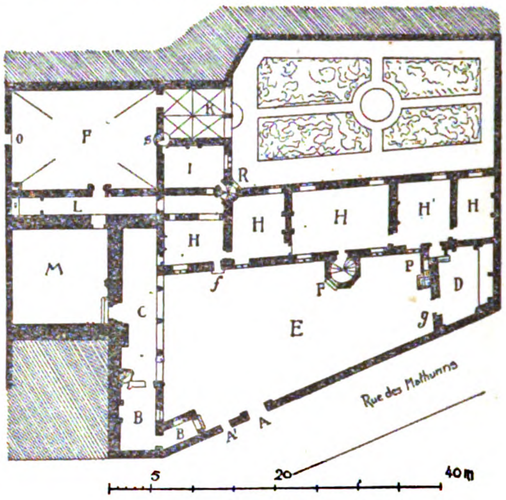

Fig. 38.

on the ground-floor, rooms into which there are also entrances by the large staircase, *F*, and by the little door, *f*. The kitchen is at *D*, with its front steps and its private staircase, *P*, leading to the floor of the kitchen and into the *salle*, *H'*. A door, *g*, gives direct entrance from the court into this kitchen. At *I* is a room overlooking the garden, with a staircase in the angle *R*, having a door into the room, *I*, and into the passage, *L*. At *K* is an open room, a sort of covered yard under the chapel, which is on the first story. *F* is a court, with an entrance, *O*, into one of the rooms of the ancient baths. *M* is also an ancient hall, in which were probably the stables. The wall on the street is battlemented, and had a wooden patrol-walk carried on corbellings, which have been destroyed and replaced by iron props. A little staircase, *S*, leads down from the *salon*, *I*, into the covered yard, *K*, and up direct to the chapel. The garden, *G*, 17 metres wide by 35 metres long, was bounded by private properties. The principal staircase, *F*, ends upon a platform which is reached by a small spiral staircase coming from the story under the roof.

The Hôtel Cluny, like the Hôtel Trémoille, had cellars, a ground-floor, a first story, and a story under the mansard roof. These buildings are very well preserved. The ancient floors, formed of beams supporting the joists, are still in use, and several of the chimneys date from the first construction.

While the architecture of the hotel has not the elegant delicacy of La Trémoille, it lacks neither grace nor style. The windows are happily placed, the staircases well planned, and the chapel is a little *chef-d'œuvre*. It has an "*absidiole*" carried on corbelling beyond the outer piers of the covered yard. Like this yard, it is arched, and its four pointed arches are carried on one central column. Figure 39 gives a bird's-eye view of this hôtel taken from the entrance side.

There still exists at Paris a hôtel of the end of the fifteenth century, the Hôtel of Sens, which was the residence of the Archbishop of Sens when he sojourned in Paris. (The Bishop of Paris was, until the seventeenth century, subject to the Archbishop of Sens.) This hôtel is built on the public place formed by the intersection of

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the streets, Hôtel-de-Ville, Fignier, L'Etoile, Barrés and Fauconnier. It was built by the Archbishop Tristan de Salazar, between 1475 and 1519. The numerous mutilations which it has suffered have almost entirely obliterated its original character.

There are still to be seen pretty hôtels of the Renaissance and of the beginning of the seventeenth century in several provincial towns. The Hôtel Pincé, at Angers, is a charming edifice of the sixteenth century; that of Vauxluisant, at Troyes, which dates from the first years of the seventeenth century, is remarkable for its plan and the happy outlines of its buildings. At Toulouse there are still a number of hôtels of the sixteenth century.

The work of Ducerceau ("*Les Maisons des Villes*") gives numerous examples of good plans and buildings of excellent taste. While the houses of the seventeenth century were only common lodgings, in which it is difficult to find a trace of art, such is not the case with the hôtels.

Under the reigns of Henry IV, Louis XIII, Louis XIV and Louis XV, in Paris, Lyons, Toulouse, Bordeaux, Caen, and Nantes a number of beautiful hôtels were built, which still preserve the arrangements of the dwellings of the nobles and rich merchants of the Middle Ages and the Renaissance. The Hôtels Lambert, Carnavalet Mazarin, the Imperial Library, Pimodan and Soubise (the Archives of the Empire) are models of grandeur and of good taste which put to shame all that we have done in this style in our day, so much easier is it to acquire wealth than to develop the sentiments of dignity and good taste.

[To be continued.]

THE PRESENT ASPECT OF LAND-DRAINAGE.[1] — II.

THE ENGINEERING OF UNDERDRAINAGE.

THE best work is, perhaps, that which is based on the general principle, which holds good in ordinary soils, that drains four feet deep may be forty feet apart. In very heavy soils, they should be at less intervals, in lighter soils they may be at wider intervals, if deeper they may be farther apart, and if shallower they must be nearer together. The range according to quality of soil would be perhaps — for after all there is no fixed rule — for three-foot drains, intervals from fifteen feet to thirty feet; four-feet drains, from thirty feet to sixty feet; and five-foot drains, from forty feet to one hundred feet. It is sometimes wise to construct the drains at double intervals. For example, if the ground is rather light than heavy, four-foot drains may be laid at intervals of eighty feet with a view to the future construction of intermediate drains, reducing the intervals to forty feet, should the first prove in time to be insufficient. Concerning this, as with other details of the work and with all work that cannot be based on fixed rules, the experience and judgment of the engineer are of the greatest importance, especially in securing a good result without excessive cost. It is not fair to a client to make him pay for fifty per cent more work than is necessary for the sake of securing one's reputation absolutely against failure. This is true everywhere, and it is especially true in underdrainage where intermediate drains may be introduced subsequently without the loss of work already done.

Underdrainage as ordinarily carried on may be divided into two classes:

(1) Thorough drainage, where the object is to give a free and prompt discharge to rain-water falling on the surface and percolating through the soil.

(2) The removal of spring and seepage water due to sources outside of the area to be drained.

In the first case, the drains should be laid as nearly parallel as the conformation of the ground will allow, and as nearly as practical at right angles to the contour lines of the land. It was long considered best, and it is even yet not entirely obsolete, to lay underdrains diagonally along the slope of the land, with a view to catching the flow from above. This is not the way to secure the best effect from the work, as will be understood if we will consider the ground to be drained in small sections, say a yard wide, running along the hill at right angles to the slope. For a short section like this, the slope is of no account. It may be treated as level land. As level land, it is most economically drained by crossing it at intervals of forty feet (more or less) by lines of drain-tile. The next yard in width above it, and the next yard in width below it are similarly situated, and they may best be drained by continuing the same tiles across them, and so on for the whole hillside.

If we run a drain across a slope, it will have a good effect for a certain distance above it, but the land below it soon becomes too low to drain toward it, and nearly the whole interval between the parallel lines must send its water to the drain at its lower side.

In the second case, where the object is to intercept extraneous water, it is much the most effective plan to carry drains across the slope in such a manner as to cut off seepage from land beyond. Usually, one such drain at the upper edge of the tract, to act as a header, is all that is required for this work. The extraneous land being cut off, the land below the header, if to be drained at all, may best be drained by the perpendicular system. To get the full effect desired from the header drain, it is often necessary to go deeper than the level, at which it is proposed to lay the tile by which the water is to be carried off, filling the ditch below with stones or gravel, allowing the water to rise from the intercepted stream to the line of exit. If the ditch crosses a rather free seam of water, the lower side of it should be well puddled with clay to cause the flow to rise to the line of the tile. If the tile can be laid at the bottom of the porous stratum, this, of course, is not necessary. If the purpose is to drain away water which now appears at the surface in the form of springs, the proper plan is not to try to circumvent the spring and cut off its source beyond, but to drive straight into it and through it at a depth which will withdrawn all of its water to a sufficient depth to be out of the way.

Draining-tiles have been made of various forms. The oldest, and the least desirable, is the horse-shoe tile which was made before the introduction of the tile-machine by moulding a flat cake of clay over a former, and which being largely in use, because originally the only tile available, continued to be made after the introduction of machines. This tile is not to be recommended for use under any circumstances.

The next step was to make what is called the sole-tile, being a round or egg-shaped pipe with a flat bottom, sometimes also with a flat top, so that it might be laid either side up. These are used considerably, but they are objectionable because of the difficulty of protecting their joints properly, and because of their liability to warp out of shape. The best for all uses, especially with the smaller sizes, are the round tiles which are now chiefly made. They can be laid on any side, so that if warped they will still have a true flow line. Their joints may be protected by encircling collars, or, better still, by a wrapping of muslin which will last, at least, until the earth is perfectly compacted around them, and is no longer likely to enter them.

The Size of Tiles. — There is no special reason, save for the question of cost, for using tiles smaller than two inches in diameter, but the difference in first cost is considerable, and if transporation is an important item, it would be better to use one-and-one-half, or even one-and-one-fourth inch tiles. The latter size, if properly laid and if jointed securely together at its ends, will give ample outlet to the drainage of an acre of land. The calculation is usually made according to lengths. When tiles are placed forty feet apart, one-and-one-fourth inches is ample for the removal of the water that will be received by a drain one thousand feet long. In nearly all cases, it would suffice for twice this length, or for two acres, but in view of the irregularity of form and the necessary construction of the channel at the joints where two tiles of irregular form come together, it is better to adhere to the former limit. If the tiles are well laid, the larger sizes will furnish a sufficient outlet for the areas given in the following table:

1½	inch	tile,	2	acres.
2	"	"	5	"
2½	"	"	8	"
3	"	"	15	"
4	"	"	30	"
5	"	"	40	"
6	"	"	50	"
8	" (or two 6 inch) 100 acres.			

It is not pretended that these drains will immediately remove all the water of the heaviest storms, but they will always remove it fast enough for all practical purposes, and, if the pipes are securely laid, the drains will only be benefited by the occasional cleansing they will receive when running "more than full."

Obstructions. — If tile-drains are properly laid, properly jointed and properly covered, they are not likely to become obstructed (unless in exceptional cases by soil) by any other accident than the intrusion of the roots of water-loving trees. If the tiles are covered by, or imbedded in, porous material with the mistaken idea that this will cause them to receive water more freely, they are always in danger of having dirt washed into them by runnels of water through the loose filling. *They should be closely packed in the firmest earth that is taken out of the ditch*, every precaution being taken to prevent water from entering them in any way but by its gradual rising from below. However careful you may be, a drain that carries water at any time when the ground about it is dry, will be quite sure to be entered by the roots of elms, willows and similar trees, standing even at a considerable distance. There is, apparently, no remedy for this, short of the destruction of the trees. We have to take our choice between losing the trees and running the risk of a frequent need for taking up the tile to free it from roots. Gisborne, one of the best writers on land-drainage, says:

"My own experience as to roots, in connection with deep pipe-draining, is as follows: I have never known roots to obstruct a pipe through which there was not a perennial stream. The flow of water in summer and early autumn appears to furnish the attraction. I have never discovered that the roots of any esculent vegetable have obstructed a pipe. The trees which, by my own personal observation, I have found to be most dangerous, have been red willow, black Italian poplar, alder, ash and broad-leaved elm. I have many alders in close contiguity with important drains, and, though I have never convicted one, I cannot doubt that they are dangerous. Oak and black and white thorns, I have not detected, nor do I suspect

[1] Continued from No. 675, page 255.

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them. The guilty trees have, in every instance, been young and free-growing; I have never convicted an adult."

G. E. Waring, Jr.

ARCHITECTURAL EVOLUTION.—I.

INTRODUCTORY.

Curious old Stove. Dudswell. Que.
This Stove passes under the partition and heats two Apartments, being fed from other side.

THE world is in a continual state of evolution. There is nothing so near "perpetual motion" as the development of the human race. A few centuries have changed a nomadic tribe, into a stay-at-home, civilized community and that community has gone on developing internally and externally until it has become a nation. It is impossible to separate a man from his surroundings and if we would write a biography, we see at once how great a part in the formation of a man's character his surroundings have had and how far more he is influenced by his surroundings than they by him.

A man is not developed without his mind. Natural instinct sets the mind to work and thus a man learns by the integral parts of his own being how to supply his wants. And as a man developes so does a tribe, a nation. Civilization is evolved from savagery. Instinct acts on the mind, and the mind on the body,—the intellectural upon the muscular,—the educated upon the ignorant. Instinct shows the savage the advantage of a sheltering roof, mind suggests to him a method of constructing it. Instinct makes him cover his nakedness, mind shows him how to paint his body or put on skins, and in each case the body, enlightened through the mind, sets to work to accomplish the end. There are three kinds of beings in a tribe who may be compared severally to instinct and mind and the body or muscular part. There are those who see a necessity; those who show how that necessity may be relieved, and those who by animal strength carry out the work. The first and second may be one, so nearly are the instinct and mind allied. By instinct the savage counts, by the score—twenty—the number of his toes, fingers and thumbs: the mind teaches him to make twenty marks and to put twenty other marks by the side of the first twenty, and so on he counts and comprehends the expression of numbers. Further enlightenment makes him put a cluster of marks or lines, together, to denote particular quantities and thus is evolved our 1 2 3 (I = ≡).

So with the covering of the body, a cincture becomes an apron, the apron a skirt, which lengthened upwards and downwards becomes a vest and from the vest arises every garment. From the texture of clothing, a great part of the ornamentation of a building is derived, patterns of the stuff having suggested forms for decoration.

The progress is slow, but development may be traced inch by inch. A tree trunk becomes a post, a pillar, a screen, a wall, of wood, stone, brick or iron; a bough becomes a lintel, an arch, a roof and so from the tangled bough of the wilderness are evolved our palaces and cathedrals.

But the theory of architectural evolution does not exclude Divine intervention, indeed there would be no such thing as progress, without superhuman interference. Instinct would have been as a dead thing and never have suggested to the savage the necessity of a roof over his head or a covering to his body. Mind would have been a blank, in fact, instinct and mind or, to speak of them as one, *soul* would never have existed at all without God; for soul, spirit, life itself is direct creation and never was evolved.

Evolutionists, who like to believe that their species had its origin in a bit of matter like an oyster, cannot tell us how, when, or where protoplasm first started on the journey of improvement. They only say it *did* start. But that cannot be satisfactory to themselves and certainly will not satisfy the inquiring public, and therefore the inquiring public has to fall back upon the idea, with which it was brought up, that there was a "something" more intellectual than the oyster to start with whose origin none can by any possibility trace, and they, happily for themselves, have to be content with the simple dictum "In the beginning . . . God created man." And created man into whose body was infused a soul and who has by this vehicle of Divine guidance been taught to make use of everything in this world, has also been taught, by an innate sense of the beautiful, that through his instrumentality that beauty of form and color which "is the expression of the mind of God seen through a material medium" may be developed and perfected. The soul of man puts life into material; dead walls may live through effective coloring—solid stone through carving. A whole building may be alive though in repose, through the true proportions of its component parts.

And now having glanced at man's origin and noted that he has in him a "spark" not of himself and that owing to that spark he is capable of improvement himself and of improving his surroundings, I will take him as I find him 4,000 years before Christ and see how the art and science of architecture was developed through his means.

EVOLUTION OF THE EARLIEST FORMS OF ART BUILDINGS.

To study the subject thoroughly we must start with the early history of the art and I shall here quote from a former paper of mine treating on that subject: The very earliest structures that have any claim to the term "Art" are discovered in Egypt and date as far back at 3900 B. C. It was then that the people first conceived the idea of erecting for their chiefs and rulers indestructible edifices, wherein the embalmed bodies might repose undecaying in security and peace, until they should again be called into life, as their traditions led them to believe would ultimately be the case. We may contemplate with amazement the great monumental excavations, elaborately decorated with hieroglyphics by which each chief sought to hand down to eternity the record of his good deeds; and as time proceeds we find in place of rock-cut tombs, enormous temples and pyramids and lofty obelisks and in each is seen an ever increasing development of what may truly be called the "the germ of art." But how and whence did the Egyptians get their ideas of these forms for their buildings. It is not necessary to go back 6000 or 7000 years from to-day and to go to Egypt to learn this, we have examples of it in every country, "prehistoric remains" which we can see for ourselves.

From living in holes and caves in the rocks, some of the people would stray to the flat country, perhaps in search of food and water; and here they dug holes in the ground and covered them over with branches of trees, and so formed themselves a secure retreat. Remains of this kind I have seen in England, and the excavations, circular on plan, would average about nine feet diameter at the surface of the ground and, sloping downwards four feet, would leave but a small level place at the bottom. We can then imagine them desiring greater height and raising the covering for easier access and greater convenience when inside. The next development would be the erection on the ground, without excavation, of a tent-like arrangement of branches covering an area sufficient to shelter a man and his family, and here is the origin of the pyramid. Then would follow the suggestion of raising the tent, propping it up on posts so as to form a roof, putting the posts so close together that they would form a protecting wall all round; and then the wooden posts would give place to stone walls, and, strange to say, the stone walls of such dwellings, sometimes a couple of feet out of ground, are found standing even now.

Every tribe would have its chief or leader, perhaps the head of the family, and a single post, bough, or trunk of a tree shorn of its branches would be stuck up on end to mark the chief's hut. This custom of setting up a post or a rock to mark particular sites or events has come down to us from time immemorial, and gave rise to the Egyptian obelisk. From the circular form of habitation, the square and the oblong would soon be reached; increase of width in the oblong necessitated additional support to the roof inside, and, by the introduction of posts to meet this necessity, we have the origin of pillars.

Because of the inborn desire for ornamentation, the rude pillars were gradually shaped; and the common objects around, such as foliage, flowers, stalks, fibres and shoots of plants, the texture of drapery, and even the curling shavings of wood, gave suggestions for decorative treatment.

Neither were they satisfied with mere form. As color existed in natural objects, so must it be part and parcel in the representations of them; the exaggeration of tone in the colors used in the well-meant attempt to copy the harmonious effect of colors in nature can be easily explained—for the art of coloring required as much developing as did architecture. But in the use and application of the forms they adopted for decoration, a very striking instance of their comprehension of the fitness of certain forms for particular positions is to be seen. The top of the pillar, slowly developed into a capital and later made a separate and distinct feature, upon which the weight of the superstructure came direct, was ornamented in an upward direction, thereby signifying resistance to the downward pressure; and in the base or foot, when this feature was developed, this ornamentation was reversed as the weight of the pillar was distributed by means of its foot over the foundation below; or again, the pillar would be ornamented at its head and foot, where no base existed, leaving the greater part of the length of the shaft plain, thus emphasizing the strength of the pillar to resistance where it comes in direct contact with the object it supports or that which supports it, leaving to the rest of the shaft the simple dignity of its own outline; and the form this ornamentation of the lower part of the shaft took was a cluster of foliage, as if the shaft rose out of the ground with the plants growing round it.

A post supporting a horizontal piece of wood with considerable weight upon it is apt to crush into the fibres of the lintel; to obviate this a short piece of wood would naturally be inserted, of the width of the top of the post, to preserve the lintel and distribute the pressure of the post. The diameter of the capital generally exceeded the width of the entablature to be supported; if it did not it looked weak, and, indeed, was so, although at the neck of the column the diameter was often less than the width of the beam, and in order that the weight should be borne by every part of the capital equally, the short piece was widened till it covered the top of the capital, thinned and made a square, instead of an oblong. The heads of the columns became very elaborate, as the wood was easy to work and carve, and when the attempt was made to use stone

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instead of wood, these forms were wrought in stone with considerable trouble and with ultimate success. From copying inanimate Nature as ornament, a rise to a higher type of art is to be noticed in the painting of the head of the deity "Isis" on the faces of the square-headed pillars, with its attributes. Painting led to carving in relief, and we soon find animals introduced into the ornamental parts of the architecture boldly carved. The Persians took up the idea, and put horses' heads and shoulders, two and two back-to-back, on the summit of their columns, but the highest art was not attained until the attempt was made to reproduce human figures in relief.

The grotesque is always easier to accomplish than a real imitation or copy, and, as the human figure is the most beautiful of created things, it is also the hardest to copy. For centuries the huge, silent watchers of tombs had sat carved out of the solid rock, grim and stolid, rough in design and execution, towering above the heads of the human visitor. The gods of Egypt were represented more than life-size over and over again, and so were the heads of many of the Pharaohs, which were handed down for generations carved in marble. But it was a long time before any attempt was made to copy the human figure, life-size. It is the Greeks to whom we are indebted for sculpture and for a more truly artistic treatment of color-decoration, for to the Doric order these sister arts eminently belong. The pediments of the temples were enriched by groups of statuary, and the faint indications of what at one time must have been very rich coloring are still to be seen on the ruins. Human figures cut in stone and marble are soon to be seen taking the place of pillars as a highly decorative substitute. But I have not yet done with the original pillars. The well-known reeded shafts of Egypt, copied conventionally from a bundle of plant-stalks, are the forerunners of all shafts treated decoratively, and from the convexity of the reed-stalks is derived the reverse; namely, the concavity of the flutes. From the flutings of the classic shafts are evolved all moulded and clustered columns. The fillets attenuated and the flutes deepened, the fillets widened and the hollows narrowed, till at last the fillet becomes a separate shaft with its cap and base, the back of the recess or hollow becomes the outer edge of an inner central shaft, and the sides are merged into the new fillet-shaft. The column passed through many stages. The Romans took it and set it upon a pedestal, and even made it do duty as a monument, standing alone, as did the obelisks of Egypt. But when they thus set it up on a pedestal they fell into a great error, for they acted contrarily to the spirit of the art. Not content with the honest beauty (than which there is no greater beauty) of ornamental construction, they began to construct their ornament. They made the pillar a useless adjunct; clapped onto the face of the real work, they made it do an imaginary duty of giving support to a heavy cornice, which, in reality, was supported by an arch and piers behind. This was the Roman order, but it was not true architecture. The Goths understood this, and took the pillar down from its pedestal and put it to its proper use.

The caps of the columns deserve our attention now. The last-mentioned were the horse-top caps of Persia. These are particularly interesting because they mark distinctly the change from wood to stone architecture, and are probably the first executed in stone. They are not suitable for stone caps, as the detail is so thoroughly characteristic of wood-work. The ornamentation is very peculiar; the projecting scrolls on all four sides would seem to have no meaning in them; but, I think, they point to the wooden origin, and that this curious form is nothing more nor less than the curling ends of shavings of wood not completely cut off — for it is exactly the appearance of a whittled stick. Scrolls play an important part in the history of all capitals, and the beauty and simplicity of the device at once commends itself to the imagination. It might have been supposed that the Greeks would have introduced these into the caps of their first order, as they appear to have admired them so much and were at such great pains to adopt them successfully in the Ionic order. But, the fact is, that the Greeks obtained every one of their ideas direct from Egypt in the first place, and their Doric columns are simply copies of pillars erected in Egypt centuries before the Greeks ever saw them. The Greeks improved them, but, that these forms had their origin in the supposed peculiarly fertile minds of these ingenious people, I suppose no one really believes nowadays. When they saw the scrolls, they tried valiantly to make use of them, and in their earnest attempts produced some of the most ungainly caps one could well wish to see. The scrolls would not fit the four sides of a square cap alike, so with the scrolls on two faces and the *ends* of the scrolls on the other two the corner columns of a temple would present a different appearance from any of the others. They were determined to have the scroll, and a bold and ingenious expedient was resorted to; they put scrolls or volutes on the two outer faces of the corner caps, letting them run against each other and project beyond the faces of the caps at an angle, thus giving to four caps each a single projecting corner. But this was so evidently a makeshift that it was soon abandoned, although their struggles with it were not to be wasted.

The ultimate result of it all was, the Corinthian cap with its four similar faces and four projecting corners at the top, each composed of two scrolls, so arranged that wherever placed, each side would present the same appearance. It was the Romans who perfected this order, and Romanesque architects were very fond of the volute, but in Gothic architecture it is by no means so prominent a feature, although, as a favorite form, it is constantly introduced in stone and color.

In the bases of columns there is not so much to demand our attention. They had the specific object of distributing the weight of the shaft and its burden upon its foundation, but, being below the eye line much decoration was inadmissible, and being so low down on the floor any ornamentation would have been in danger of damage. For pillars in the open-air, carving or deep recesses, besides being easily damaged, would have been but rain-holders and of no practical use. The simplest form of base was, naturally, a square block; the circular shaft coming down upon it, left large, useless and awkward spaces at the angles: imagine these rounded off at the corners and the upper part of the block so treated, cut off from the rest of the block and used as a distinct base rounded to follow the circumference of the shaft; and, then, by slightly undercutting this new member, we have the torus which is common to bases of all ages, since it was introduced. R. W. GAMBIER-BOUSFIELD.

(To be continued.)

SOCIETIES

PHILADELPHIA CHAPTER A. I. A. TRAVELLING-SCHOLARSHIP.

IN the second competition for the Travelling-scholarship of Fifty Dollars for the best design submitted by any junior member of the Philadelphia Chapter of the American Institute of Architects, the award was made to Mr. Howard Spruance. The programme of the competition was as follows: Subject, a City House Front sixteen feet wide, style Flemish, drawings required — elevation and section, one-fourth in scale. Paper, bristol-board 18″ x 28″. Rendering to be optional. Almost half of the drawings were barred from competition by the fact that they were not in the style called for by the programme. The committee were Frank Miles Day, Lindley Johnson and T. Roney Williamson, architects.

NOTES & CLIPPINGS

CHINESE GRAVEYARDS. — But as soon as China was reached, the silent cities of the dead came again to the fore, with greater prominence than ever. One stands on the walls of Canton near the Five-storied Pagoda, and sees the hills to the north all covered with graves. It is the same near any Chinese city. The living occupy the city and the level ground, the dead the hills. No corpse is allowed to be buried within the walls of a Chinese city, and without, the vast cemeteries cover the hills with no fence or other limitation about them. The Chinese family which can afford it, builds a "horse-shoe grave," or bricked vault on the hillside with the end built up in the horse-shoe form. Poorer people stick their dead in shallow graves on which a small tablet of wood or stone is put. In some districts of Quang-tung, near the headwaters of the Pe-Kiang River, the cemeteries consist of big jars set in niches of the rocky cliffs of the Mae-ling Mountains. As you pass along the foot-trails you see the steep rocks above thickly studded with these big earthen jars, in each of which is a human body in a sitting position. In the rich alluvial plains, where no uncultivable hills are available for burying the dead, a graveyard resembles very much a white ant village in Africa. The graves are sugar-loaf mounds, thickly clustered together. While John Chinaman pays great respect to the dead, he takes care that they do not appropriate much ground that is of value to the living. The cemetery of a Chinese village among the rich rice-fields, covers very little ground in proportion to the number of graves. It seemed to me that bodies must have been placed one on top of another, or stood upright, so thick were the tapering mounds. The Chinese graveyard is, on the whole, a less disreputable-looking place than the Turkish or Persian; yet the horse-shoe vaults are sometimes seen in a very dilapidated condition. When passing through them I have frequently peeped in and seen the crumbling coffin and the skeleton. In some parts of China one seems to be travelling through cemeteries most of the time. Particularly is this the case in thickly populated districts, where the topography is undulating plain. The ridges, where the soil is thin, are then the cemeteries, and a rigid spirit of economy has relegated the alignment of the public roads thereto, rather than through the fields. In such a district the traveller is in the company of the dead all day long. Among some of the aborigines of China their cemetery is a bamboo grove. The dead, swathed in matting, are lashed in an upright position to the stems. Here they remain until the ravages of time, birds, insects, and the elements have reduced them to skeletons, when the bones are washed in hot water and buried. These people tie up the male bodies in one grave and the female in another. — *Thomas Stevens, in the New York Evening Post.*

THE WASHINGTON MONUMENT. — The November number of *Stone* says great care is taken to note the movements of the Washington monument, for it does move. The law of contraction and expansion of material by heat and cold operates here as elsewhere. When the sun shines full on the eastern face in the morning, the stones on that side expand and throw the shaft slightly to the west. Then the sun goes around to the south, and the apex of the monument makes a corresponding swing to the north. As the orb creeps about the sky to its final setting in the evening, the glittering point on the top of the monument makes a contra-movement around half a circle, gradually settling back to its normal position after the rays of the sun have lost their power. This movement has never been calculated, but is undoubtedly

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very slight. The wind, too, has an effect upon the structure. From the centre of gravity of the shaft, located 174 feet and ten inches from the floor, is a cross-beam from which is suspended a fine steel wire, protected by a galvanized-iron tube about four inches in diameter. This hangs to the floor at the north-west corner of the elevator well. At the bottom is a plumb-bob weighing twenty-five pounds, suspended by means of the wire, and hanging in water. An iron cylinder protects the instrument from injury, and a little iron house four feet high keeps off the draught. Through the cylinder is a telescopic eye-piece, in one end of which are two vertical wires about one-quarter of an inch apart. When a candle is held at an opening in the side of the box and the eye is applied to the outside end of the tube, the plumb-line can be seen — a fine line between the vertical marks. Any movement in the shaft is recorded by a corresponding movement in the line. When the structure is at rest and in its normal position, the line hangs still, midway between the others; but when the shaft is disturbed by the action of the wind it sways back and forth like the pendulum of a clock, always coming to rest in the centre. This is observed every day, and if the custodian should ever notice the line hanging still at any point outside of the two cross lines he will then know that the monument has been permanently moved from its level position. Until then, however, no one need be alarmed by the oscillations of the shaft from the action of the wind or the influence of the sun. — *The Architect.*

The Effect of Moisture on Wood. — Dr. Hildebrand has carried on investigations into the action of moisture upon various kinds of wood, the results of which he publishes in Wildeman's "*Annalen der Physik und Chemie.*" We learn from the article on the subject, which is a lengthy one, that the author confined himself in his experiments to observing the extension of the longitudinal fibres of wood, leaving out of consideration the well-known phenomena of the swelling and the shrinkage of wood, which take place in a direction perpendicular to the longitudinal fibre. The author finds that, within certain limits, the length of wood in the direction of its fibre depends upon the amount of water present in its membranous tubes. Supposing a wood absorbs from twenty to thirty per cent of water (which is the range of the increase of weight dried under an air-pump), the increase of length varies between one-tenth and two per cent. The greatest length is attained when wood is kept in air saturated with steam, or when placed in water. The weight and length of wood increase with the relative moisture of the air, and diminish with the decrease of moisture. The kinds of wood named below, which were exposed to the natural variations of moisture in the air during summer, showed the following changes:

	Relative Moisture of the Air.	Variation in Length. Per cent.
Mahogany	0.814 / 0.570	0 057
Ebony	0.814 / 0.665	0.03
Fir	0.798 / 0.765	0.012
White Beech	0.814 / 0.570	0.05
Red Beech	0.814 / 0.570	0.043
Alder	0.814 / 0.665	0.047
Oak	0.798 / 0.584	0.062
Lime-tree wood	0.798 / 0.584	0.028
Maple	0.814 / 0.665	0.019
Pine	0.798 / 0.570	0.043
Poplar	0.814 / 0.570	0.069

The author says that great care should be exercised in selecting wood for measuring-rules. Mahogany and oak are entirely unsuited for rules, and the best woods to be used for the purpose are maple, fir, red beech, and lime-tree. He also states that the usual treatment of wood with polish, oil, or lacquer does not protect wood from the action of air saturated with steam. The best protection is afforded by lacquering, but the lac employed should be most carefully selected if the wood is intended for rules to be used for exact measurement. The author further adds that even ivory is not free from the action of moisture. — *The Builder.*

The Cross on the Pantheon at Paris. — The Municipal Council of Paris has given orders for the removal of the iron cross on the Panthéon before the end of the year. To execute this order will be a very difficult task. A scaffold will have to be built around the dome, and this, with the cost of labor on the entire job, will entail an expense of $6,000. This cross, or rather the point where it is set, has had a checkered life. A cross was taken down in 1831 and in its place a colossal statue of "Fame," by Cortot, was ordered to be set up. But hardly was a model raised on the dome, in 1838, than the hisses of the critics brought it down again. Until 1852 the dome remained uncrowned. Then the Government placed on it the wooden cross which remained there until late in March, 1871, when the Communists sawed it off. After peace and order were restored, M. Jules Simon caused to be put up the iron cross which has now been ordered away. Why the cross should be taken down can only be explained on the hypothesis that the City Government is opposed to any religious symbols on the public buildings which are within its control. To pay out the $6,000, however, seems a wasteful use of money. But the Municipal Government of Paris, like its counterparts in some American cities, is always ready to spend other people's money foolishly. — *Boston Transcript.*

Pavement Material and Locomotion. — It may be thought that the material of which a sidewalk is constructed is of small importance so long as a sidewalk is there. This is a great mistake. The influence that the surface of a sidewalk has upon the ease with which a pedestrian gets about can only be realized by close observation and experiment. Take a number of sidewalks, all slightly undulating, and experiment. It will be found that a polished stone sidewalk requires fully one-half more exertion to traverse than an equal distance of granite pavement requires. A brick walk gives much less fatigue, while the iron walk, cast with little projections, is by far the easiest of any to walk upon. My attention was called to this while making a series of walking races with a man who invariably passed me on going home. Do what I could, I could not keep pace with him on the smooth stone. One night, however, I chanced to take to the iron walk that was inside the stone, and to my surprise found that I excelled him in speed, with far less fatigue than when being regularly distanced on the same footing. — *Engineer, in New York Mail and Express.*

Traction over Different Pavements. — It is stated that if one horse can draw a certain load over a level road on iron rails, it will take one and two-third horses to draw the same load on asphalt, three and one-third horses to draw it on the best Belgian block, five on the ordinary Belgian pavement, seven on good cobblestones, thirteen on bad cobblestones, twenty on an ordinary earth road, and forty on a sandy road. — *Sanitary News.*

TRADE SURVEYS

The ordinary business man should take very little account of the wars and rumors of wars talked about in the daily and weekly trade and financial journals. Do what they may a spirit of competition has set in which will render practically null combinations to arbitrate and arrest competition or to preserve prices at a normal limit It is to be expected that the wealthy producing and wealthy exchanging interests will make a valiant fight to maintain high earnings and margins and it is proper that they should do so, but all of their efforts and combinations to maintain a sort of supremacy to the universal law of competition will result in nothing but disappointment to them when the fight is finally over. Trade and trade methods are passing through a transitional period and some of the effects of these transitions are the depressing influences at work. Railroad managers may combine and scheme to formulate schemes and enter upon solemn agreements to do this and that and the other thing, and manufacturers may form associations and impose fines for violations, and manufacturers may come together and agree upon prices and rates and arrangements for the conducting of trade, but so far as preventing the downward tendency in prices, combinations and associations will prove valueless. All these conditions are absolutely necessary for the development of a better commercial system than we now have. Defects in doing business and in exchanging products will be gradually eliminated. These defects are the results of generations of growths and they can only be removed through the sharpest kind of competition and the greatest possible pressure that can be brought to bear against them. No harm will come to the vital interests of the people. The organizations of trusts harmful as they appear, will result in certain compensating advantages in trade that will make up for any temporary damage they may do. The Trusts as they exist are stimulating all outside financial interests to join in reorganizing trade methods and to put trade on a sounder basis. Existing methods will do for a small business but they will not for an immense business. The country is formulating new rules for its guidance. Its financiers are devising or attempting to devise a new financial system. Its railroad managers are attempting to form combinations that will eventually control the entire railway system of the country. Its Boards of Trade are discussing in their annual conventions, measures by which present methods can be improved and harmonized. Manufacturers are endeavoring to bring about a unanimity of interest in various branches by which production can be controlled within safe limits. All of these efforts are right and necessary and will continue till an organization in ways and methods has been effected. The same change is now going on in business affairs that was brought about in our political affairs by the Civil War. Prior to that contest there was but little of the spirit of nationality among the people. That contest brought people in all quarters of the Union into bonds of sympathy. Trade contests are now bringing about an analogous condition. Capital which has been hugging the East and its large cities is irrigating remote sections of the country and is earning its owners good returns. There is a steady outflow of people all over the country and industrial sections are springing up by the score. New conditions and new possibilities are developing themselves. This is creating elements of strength to business and trade interests. But little new business will be done for the next thirty days. Manufacturers want to see their way clearly. Strange, to say, there is an upward tendency in prices in many directions. Textile manufacturers are between two fires. First, an advance has taken place in wool. Second, the possibility of increased importations of foreign dry goods in the event of an advance in this market. Leather has advanced but boot and shoe makers are still selling goods at old prices. Iron and steel products remain firm in price, in spite of the increasing output. Nearly all railroad companies will be buyers of rolling stock. Locomotives and railway material in general will be in excellent demand during the coming winter. Within two or three weeks large contracts for shipping of various kinds have been placed in the ship-yards of Maine and on the Delaware. Consumers of coal are waiting till prices settle. They seem to entertain the opinion in a general way that there will be a heavy increase in production this winter, and that in consequence, prices in the early spring will weaken and that they will not contract for next summer's supplies in view of this possible drop in prices. Everything points to a very active demand for all the available capital of the world. More money has flown away from British financial centres within the past two years into foreign countries than during the previous five or six years. Schemes are looming up in South America, Australia and in other foreign countries calling for capital and an equalization is going on not only in money but in population which will have a very important influence upon financial and political conditions of all countries. The evils of congestion which have afflicted European countries so long, will be more speedily improved by this distribution now being stimulated by the inducements of profit than by all the legislation that short-sighted statesmen or Government-hating anarchists can bring about.

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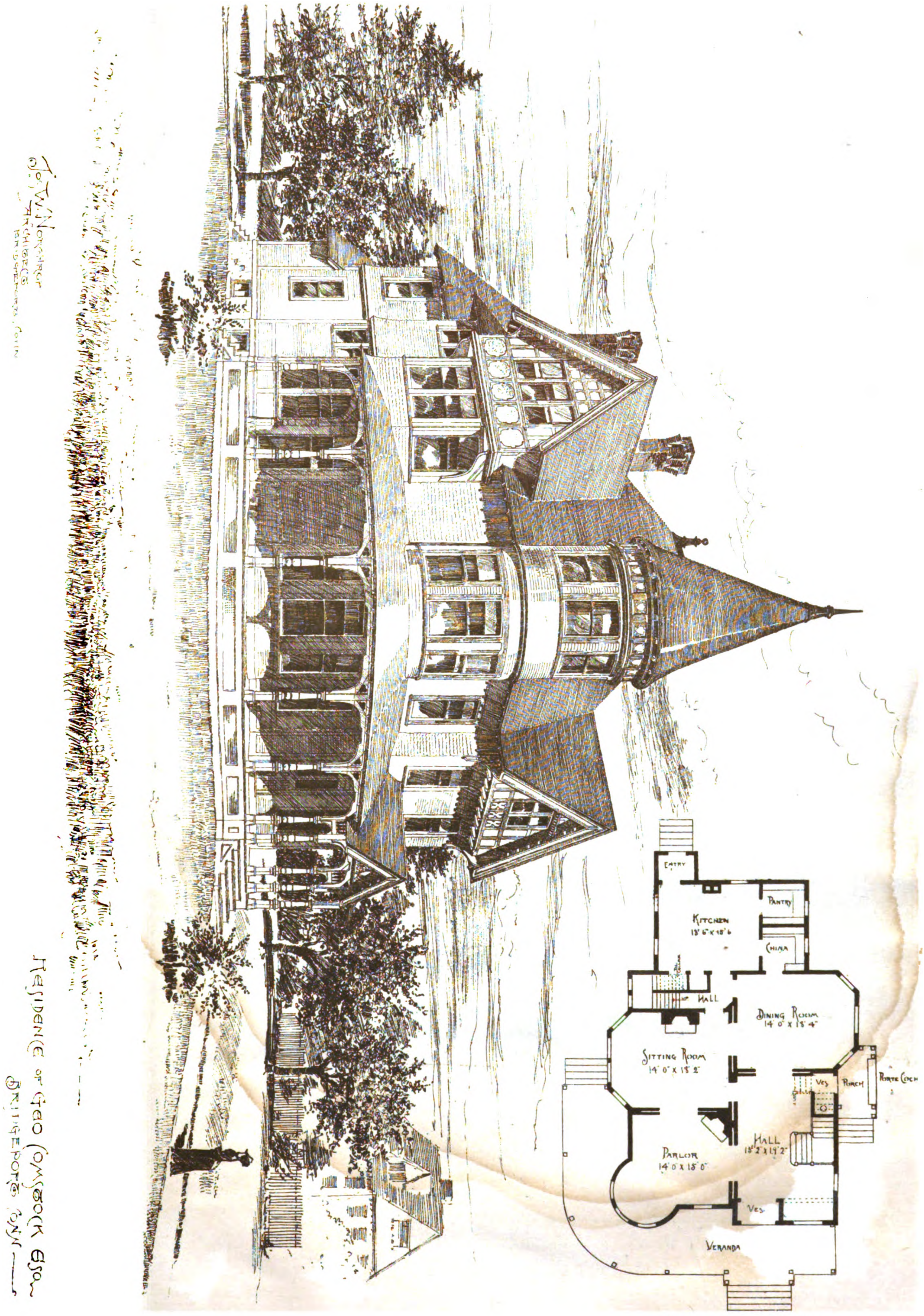

FIRST FLOOR PLAN

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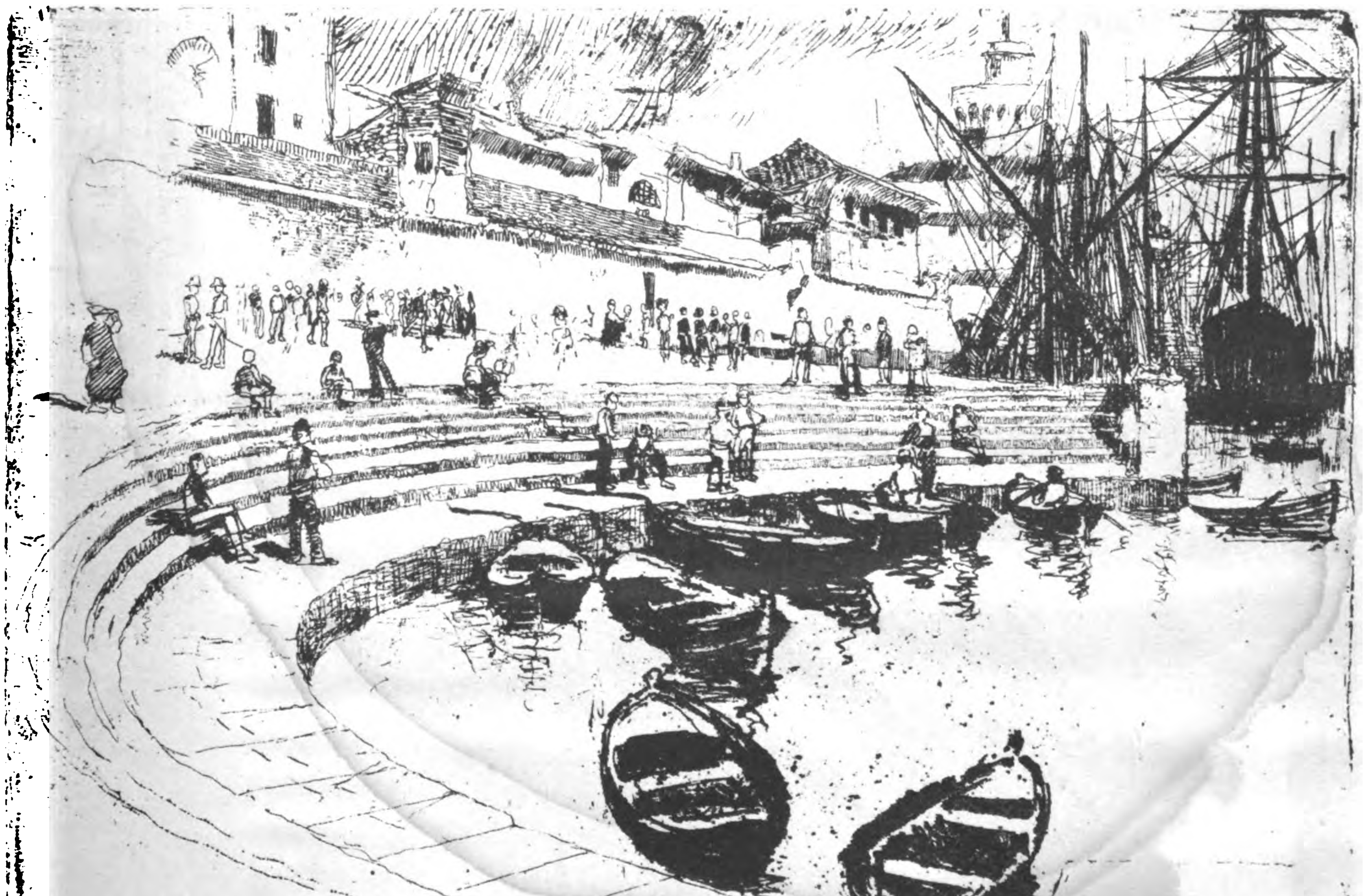
AN ALLEYWAY, PHILADELPHIA.



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LANDING PLACE, LEGHORN.

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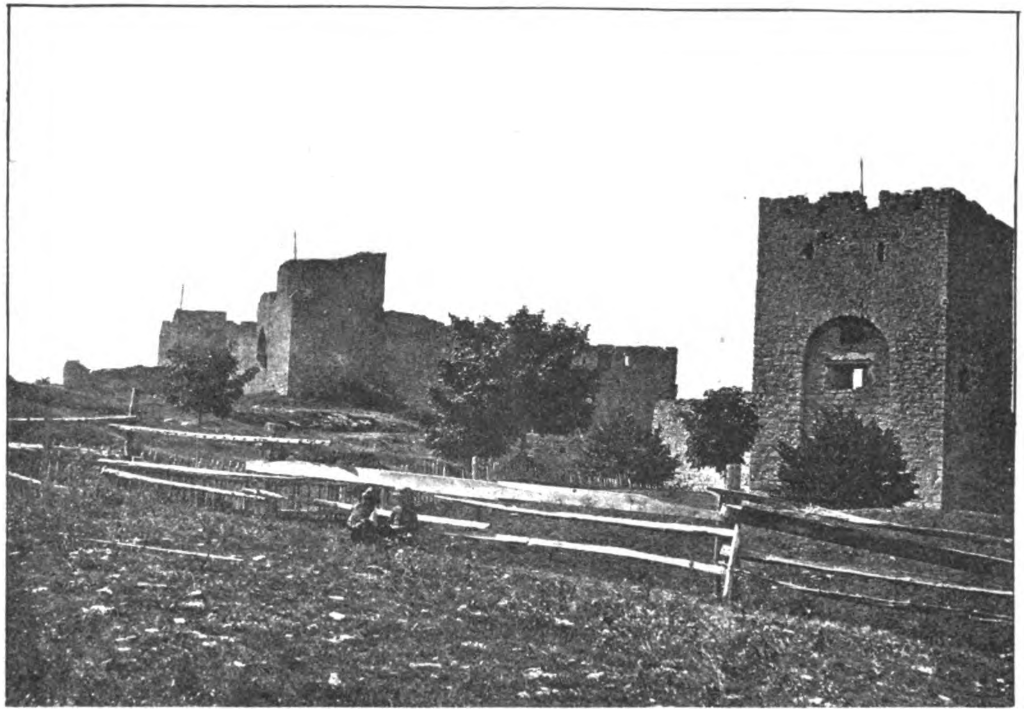

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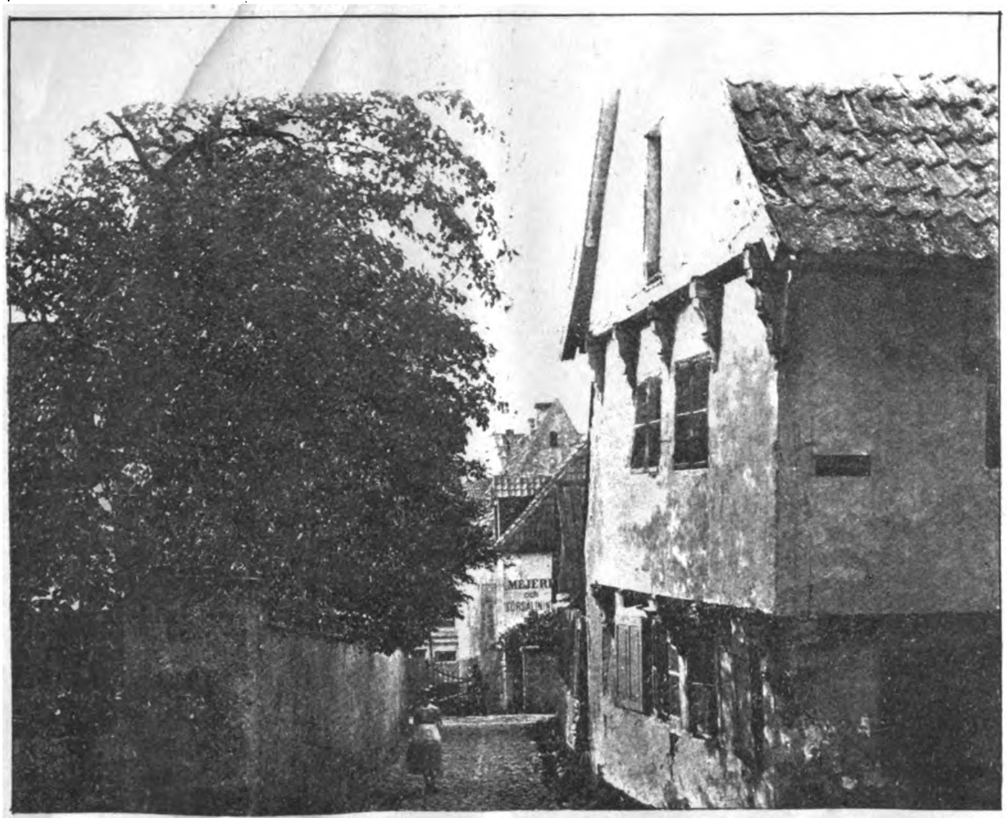

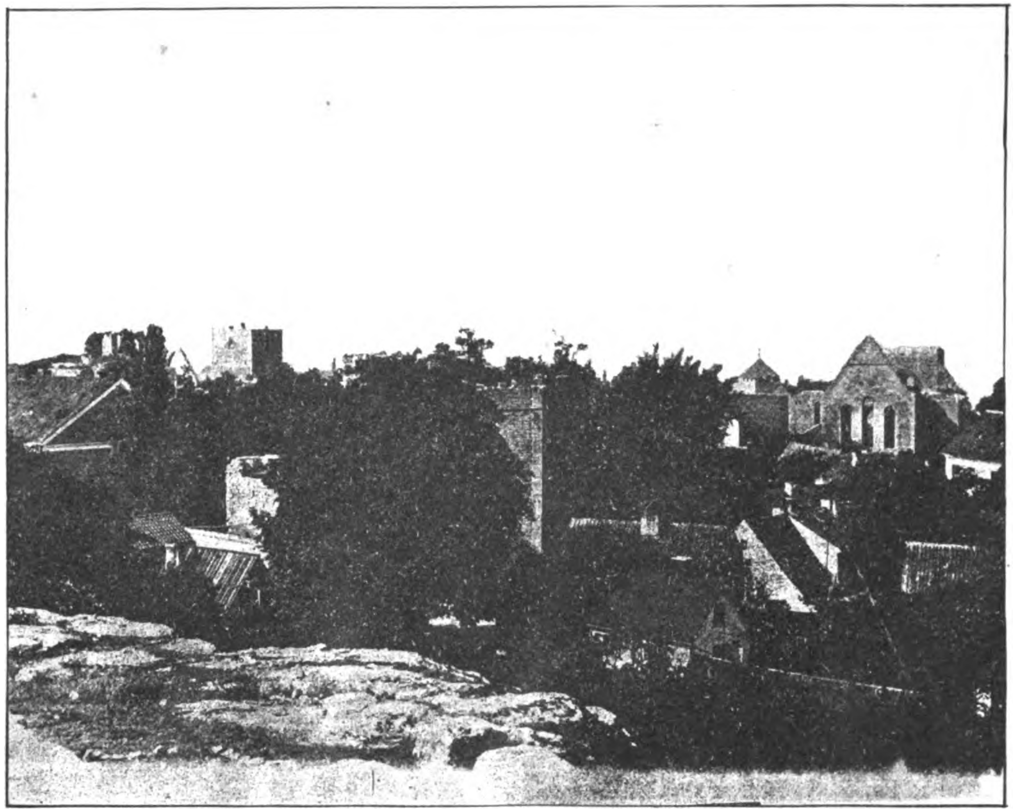

VIEWS AT WISBY, ISLAND OF GOTLAND, SWEDEN.

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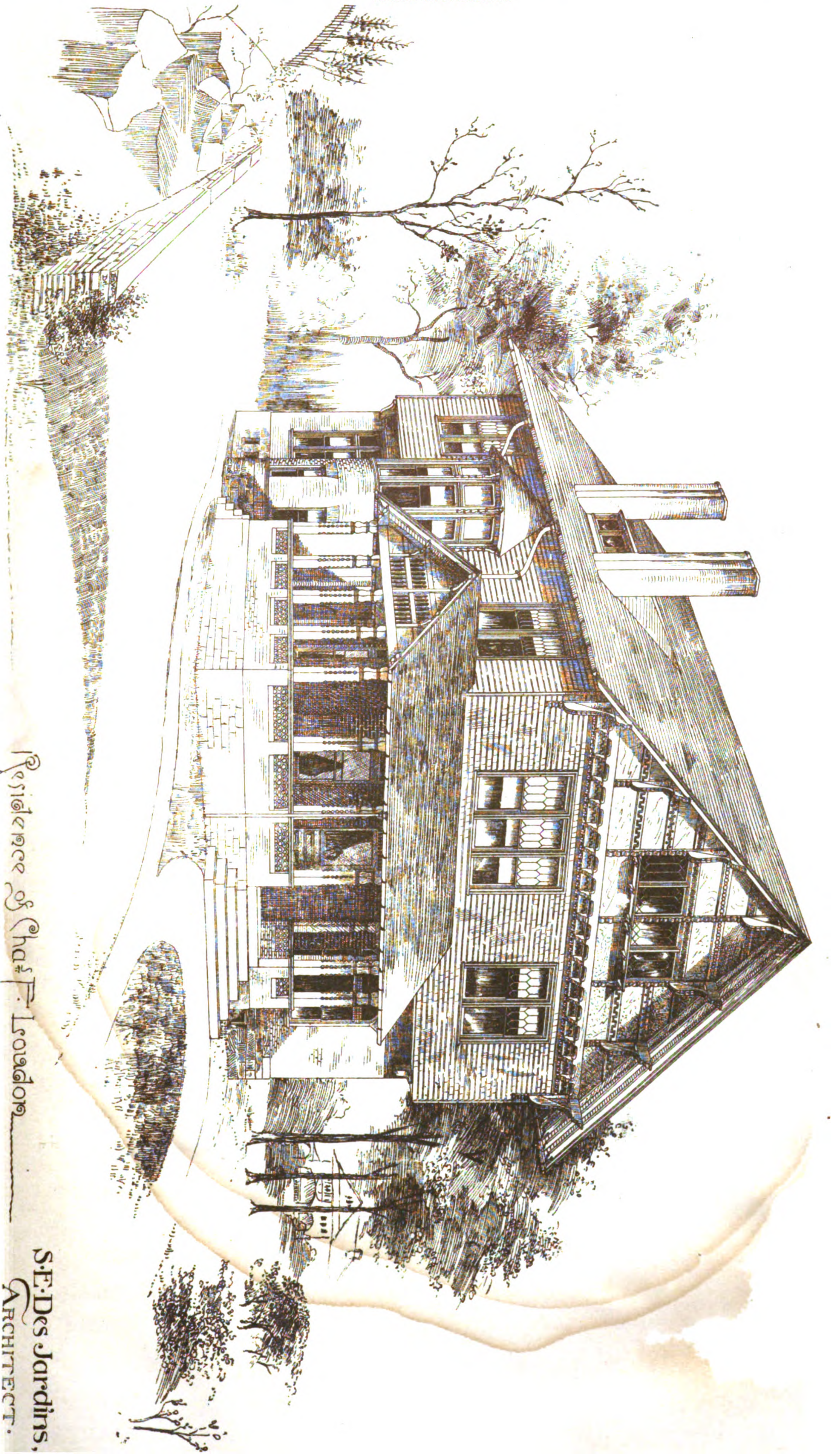

Residence of Chas F. Loudon
Avondale, Ohio.........

S.E. Des Jardins,
Architect.

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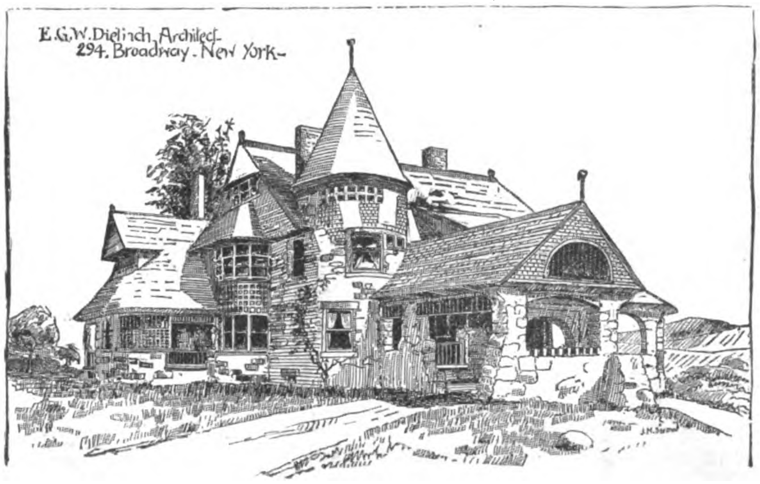

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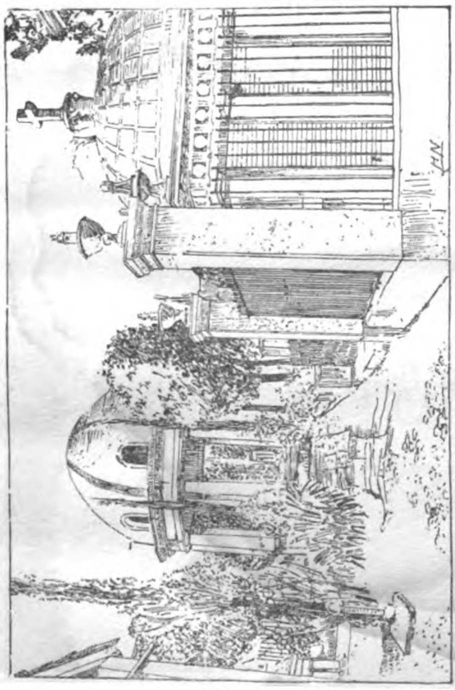
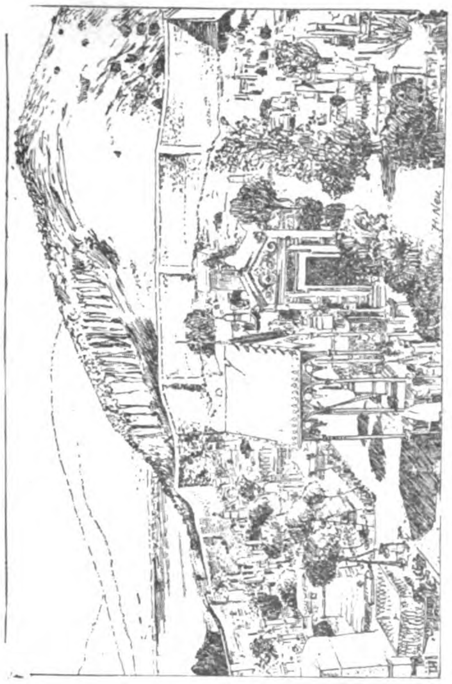
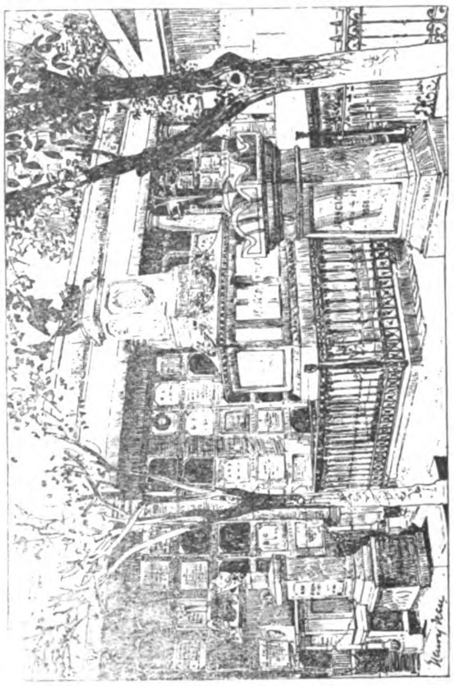


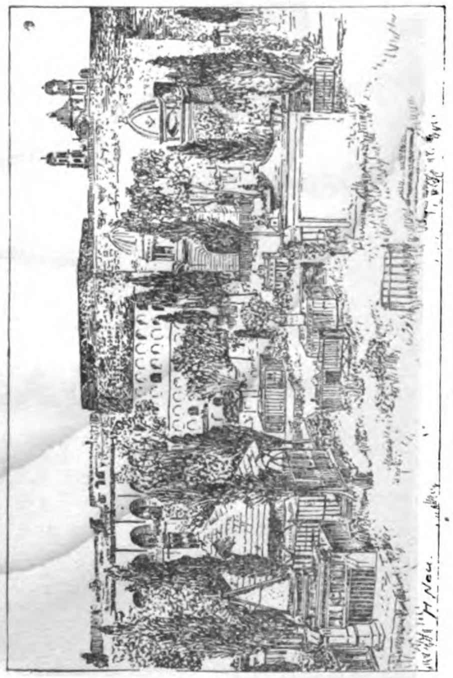
Panteon Municipal, Jalapa.



Panteon de Tepeyæ, Guadalupe.



Tomb of President Comonfort, in the Panteon de San Fernando, Mexico.



Panteon de San Francisco, Pueblo.

Panteon Santa Clara, Toluca.

MEXICAN BURIAL GROUNDS.

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THE AMERICAN ARCHITECT AND BUILDING NEWS.

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DECEMBER 22, 1888.

Entered at the Post-Office at Boston as second-class matter.

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NO one has so good a reason for making the necessary effort to spend a year or so in European travel as the architectural student, there is no one who can derive so much real benefit through such a trip, and, again, there is no one who can bring a larger concourse into partnership in this benefit, since his executed works will stand for years before the eye of the public. The number of architects who sooner or later accomplish a trip through Europe is very large, but in many cases it follows rather than precedes the years of active practice: it is the long-promised "treat" earned by faithful endeavor, and not a necessary and legitimate preparatory step. There are some young men able to take this finishing step without stopping to count the cost, but there are more to whom the cost is a matter of utmost consequence, who must economize for years before they have laid by enough to pay for even a flying-trip, who, when at last the necessary sum has been secured, may find themselves confronted with the necessity of abandoning either their long-projected trip or foregoing the chances of a promising business which is just opening before them. It is for the benefit of this class that the *American Architect* has decided to establish a travelling-scholarship to be awarded in July next.

THE benefit of scholarships is usually so restricted by conditions that the field from which beneficiaries can be drawn is really a very limited one. Thus the Rotch Travelling-Scholarship is open only to those employed in Massachusetts offices, and the new scholarship of the School of Drawing and Painting offers its hospitalities to New Englanders only. The *American Architect* Travelling-Scholarship will, on the other hand, be as untrammelled by restricting conditions as possible. It will be open to architectural students, draughtsmen and architects, between the ages of twenty and twenty-five years, in *any* part of the country, whether they be male or female, white, red or black. The amount of this scholarship is to be five hundred dollars, and, as one object of its foundation is the greatest good of the greatest number, its period is limited to one year, though we shall feel at perfect liberty to increase either term if circumstances warrant. The scholarship will be awarded after examination in drawing, designing, construction, the history of art and one foreign language. This examination is to be both oral and written, and to take place during the coming month of June. A contestant for this benefit must have had two years' practice in offices of members of the American Institute of Architects or the Western Association of Architects, but a graduate's diploma from a technical school will be accepted as a substitute for one of these years' work. As there are some minor particulars to be decided, such as the possibility of conducting the examination by mail or holding auxiliary examinations in other cities than Boston, it would be a help to us if those who think they may possibly present themselves as competitors would notify us of this fact at as early a day as possible.

TAKING it for granted that a European trip is desirable, and that there are many who would take it if they could secure the needful money, it has occurred to us that we could help not only one student, as in the case of the Travelling-Scholarship, but an indeterminate number. To secure this help, the only prerequisite is a *quantum* of the "grit" that enabled a former classmate to carry back to his father in Oregon the same one-hundred-dollar bill that had been with much self-sacrifice provided to help him through the seven long years at Exeter and Harvard. It seems to us that there may be several young men who have the necessary pluck and determination to seriously undertake the somewhat difficult task of canvassing for subscriptions to this journal, when the object to be achieved is a glimpse of the architectural glories of the Old World. If there are any such young men, who will attempt the work in the same spirit that our old classmate sawed wood, carted ice, built fires and, later on, "coached" less able fellow-students in mathematics and Greek, we have no doubt that we shall be called on several times next summer to provide ocean-passage for those who have succeeded in their task. This is hardly the place to state the particulars of our offer, but those who feel like making the trial can obtain the required information on application to us.

NO one can seriously question that the architects of Massachusetts are quite as desirous that the enlargement of the State-House shall be a credit to the State as are the Governor and Council, and that in abstaining from taking part in the competition which is offered them they are actuated by principles of real weight and importance, and are not behaving like a parcel of boys who declare they "won't play" because they can't have their own way. We will not say that the Commission should not have dared to so trifle with their high powers, to so put the honor of the State in jeopardy, to squander even the meagre sum that is offered to architects as prizes, by proposing terms of competition which the profession and no small portion of the community understand to be rankly improper; but we will say that we feel and believe that, finding that they have been ill-advised, they will be willing to seek a way by which, with honor, the blunder can be saved from becoming irreparable. If they will bring to mind the result of the Boston Public Library competition, which also was organized by a politic body who thought it was unnecessary to heed the advice of men who, besides their citizenship, had more at stake in the matter than any other class, they will be saved from wasting their $3,700 as the city of Boston wasted its $10,000 on an indifferent and wholly unusable lot of designs. Having publicly advertised the competition, they cannot with safety wholly abandon it, but they can extend the time, revise the conditions, give the $3,700 to the second and third designs in rank, and the work to the best man selected by and with the advice of a competent architect as adviser. This they can do without loss of dignity, and this they should do as efficient, though temporary, guardians of the dignity of the State and trustees of the funds raised by the taxation of the citizens of the Commonwealth. The Boston Society of Architects trusts that all architects practising in the State, and all others who may feel inclined so to do, will join in the effort to convince the Commission that delay, waste and immediate failure, if not lasting regret, will be the only result of adhering to the present programme. The chance of finding a satisfactory design amongst those which may be sent in by draughtsmen willing to gamble for the money prizes is too slight for a business man like the Governor to seriously consider. The buildings at North Easton were not secured in this way. Think of it — Massachusetts, with more of State pride than any State of them all, who stands highest in the average intelligence of her citizens, who lays claim to the highest degree of cultivation in the arts — Massachusetts, God help her! seeks through her Governor and his Council to bargain and chaffer like a Jewess, to browbeat an honorable body of citizens, and, if successful, stands ready to echo the speech of a legislator at the State-House the other day, who said: "It is all well enough to talk about your schedule of five per cent, but you know very well that you

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architects will work for anything you can get." Do you, gentlemen? Will you do this work for anything you can get?

WE have this week to regret the loss of two architects who did honor to the profession in America, and both of whom were shining examples of the courtesy, faithfulness and sincerity which, it is our pleasure to believe, are more cultivated among architects than, perhaps, in any other lay profession. Singularly enough, death came to both very suddenly and painlessly, and one cannot help thinking of Mr. Pfeiffer, who died in the cars a few months ago, and of Mr. Sims, who expired in his office, after a few moments of distress, and wondering whether a quick and merciful removal from worldly anxieties is to become the usual reward of the ceaseless, and generally unselfish, toil which is imposed upon the profession in this country. The earlier death which we must chronicle this week is that of Colonel Arthur Crooks of New York, who was seized with paralysis of the heart while on his way home, and lived only a few minutes. Colonel Crooks was born in England, in Exeter if we are not mistaken, about fifty-one years ago, and began the study of architecture there: coming to this country just before the war, he joined the Union Army, and served four years. After peace was declared, he entered the office of Richard Upjohn, where he found plenty of occupation, of the kind he liked best, in designing church work. After Mr. Upjohn's death he practised successfully on his own account, building nearly a hundred churches of various denominations in and about New York, as well as many dwelling-houses and other buildings. His most noted work, perhaps, was St. Thomas's Church, on Fifth Avenue, in New York City, a very rich design, on an unusual, but effective and convenient plan. Some days after the death of Colonel Crooks in New York, Mr. Nathaniel J. Bradlee, of Boston, while in the cars on a business trip, was seen to gasp once or twice, and fell dead into the arms of a friend who was sitting beside him. Although of late years the trusts and appointments which were showered upon him had withdrawn him almost entirely from professional practice, Mr. Bradlee was one of the most experienced architects in Boston. He was born in that city in 1829, and after graduating at the Chauncy Hall School, a noted private academy there, entered the office of George Dexter, then one of the principal Boston architects. He remained with Mr. Dexter until his death in 1856, and succeeded to his practice. Three years later he was appointed, on behalf of the city, to superintend the moving of the Hotel Pelham, a work which any building-mover would undertake now, but which at that time excited the greatest interest and apprehension. From that time business flowed in upon him, and his name is connected with hundreds of the finest buildings in the city. At the same time public office sought him with importunity. He was for three years President of the Boston Water-Board, and was twice nominated for Mayor of the city, and served as president or director in a score or more of corporations. Personally, Mr. Bradlee was perhaps the most modest, as well as the most trusted and respected man in Boston. His kindness and desire to oblige were as inexhaustible as his conscientiousness and sense of justice, and he joined with his honesty and unselfishness an industry which made him very successful in business, for himself as well as others. In his professional work he was for many years assisted by Messrs. Winslow and Wetherell, who became his successors after his retirement from professional practice, and, as he was always careful to explain that a large part of the credit of his later buildings belonged to them, we can do no less than follow him in saying that their names should be joined with his in the most meritorious of the works commonly attributed to him. Among these are the Rialto Building on Devonshire Street, the Hemenway Building on Tremont Street, the Commonwealth Bank Building on Devonshire Street, the Bank of Mutual Redemption on the same street, and many other structures, public and private, in all parts of the city.

WE take much pleasure in calling the attention of those of our readers who may be interested in the matter to the earnest invitation of the National Association of Builders to all members of that profession to join in the work it is doing. At present, twenty-four cities are represented in the Association, and send delegates to its meetings, but there are thousands of builders of the highest character and ability, who do not live in the towns possessing organized builders' societies or exchanges, or whose business does not demand membership in the local exchanges, and have thus had no part in the formation of the national organization. The preliminary work of establishing the national body on a firm basis has been very well done by the representives of the larger local societies, who were immediately available for the task, but the officers desire to extend its constituency without delay, to include the profession throughout the country without regard to local lines, and, with this object, they call upon the builders, in all towns where such a thing is possible, to organize associations which can put themselves in communication at once, by means of delegates, with the Federal body. Where no local association exists or can be formed, the circular of invitation requests individual builders who may be interested to meet informally and appoint representatives, who may take part in the proceedings of the next convention, even though their appointment proceeds from a body without any definite organization whatever. Although this may seem a little irregular, it is probably a wise plan, for the informal delegates can certainly do no harm, while their attendance at the convention will be sure to inspire them with ideas which will make them effective missionaries on their return in promoting the establishment of a local society before another year. The National Convention meets this year on the second Tuesday of February, in Philadelphia, and those who wish for extra copies of the circular in question, or any other documents on the subject, may get them from the Secretary, Mr. William H. Sayward, 164 Devonshire Street, Boston.

THE *Engineer* gives a curious account of the new high explosive, bellite, the invention of Mr. Carl Lamm, of Stockholm. Bellite is not very unlike our "rackarock" powder, being a mixture of dinitro-benzol with a solid substance; but the solid portion of rackarock is chlorate of potash, while that of bellite is nitrate of ammonia, mixed with the nitro-benzol in the proportion of five of the former to one of the latter. Thus prepared, bellite is a yellowish powder, resembling nitrate of ammonia in taste and smell. It is furnished either in the powder form or compressed in cartridges, and has the great advantage over the nitro-glycerine preparations that it can only be exploded by means of a detonating cap. In some tests of it made in England, a mass of iron weighing half a ton was dropped from a height of twenty feet upon a packet of bellite cartridges lying on a thick iron slab without causing any explosion; and a pound of gunpowder, fired inside a bundle of unprotected cartridges, simply scattered them about, without igniting them. When thrown upon a hot fire the bellite cartridges melted away, with hardly any appearance of burning. Properly used, however, the energy developed by the new explosive is very great. Three pounds of it, exploded under ground, threw earth to a height of at least one hundred feet, and excavated a pit eleven feet in diameter and nearly eleven feet deep; and one or two ounces, exploded on an iron rail, tore and bent the rail over a space nearly two feet long.

A CURIOUS engineering difficulty was encountered in a town in Canada a few weeks ago. According to *Fire and Water*, the inhabitants of the town of St. Ambrose noticed that the water drawn from the street pipes had a peculiar taste, and it occurred to some one to see if anything out of the way had got into the reservoir. An examination of this was, therefore, made, and the bodies of eleven infants were fished up. One would not think that the inhabitants of a small village in which eleven children could be murdered within a short time without any one inquiring what became of them need be squeamish about the taste of the water in which they were drowned, but there seems to be dissatisfaction, and the prospect is that the reservoir will have to be cleaned out. As a security for the future, *Fire and Water* proposes to have the reservoir covered, or watched. We should say that a still better security, which would have its effect over the surrounding judicial district, as well as in the village itself, would be to catch the people who murdered the babies, and hang them in conspicuous positions around the reservoir.

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AUTUMN JOURNEYS IN MEXICO.[1] — III.

JALAPA.

Puente del Toro y Orizaba, Mexico.

IT is probably because Jalapa can only be reached from Vera Cruz by a tramway ride of fifty-seven miles, that so few tourists in Mexico ever see the cleanest and most picturesque town in that country. Taking as it does an entire day to make the journey thither and another to return, few there are, even among those who hear of the beauties of Jalapa, who feel that so much time can be spared, especially as the weather never can be counted on in that locality. The town lies on the mountain range nearest the gulf coast, and the vapors rising from the gulf and meeting the cooler air of the mountain tops, produce many days of mist and rain in Jalapa, and one's chances of finding a good day for sight-seeing at the end of the long tedious journey are not good. It was my good fortune to make the journey on a cloudy day and to see Jalapa under the brightest sky imaginable, so that I feel amply repaid for my two days' of tramway riding between Vera Cruz and Jalapa.

To reach the "City of Jalap" (for that is whence the famous old drug derives its name, the same being extensively produced there), the traveller has to arise very early and take the train out of Vera Cruz at four o'clock in the morning. Stopping at the second station, about thirteen miles from the city, a change is made to a tramway and the remainder of the journey is made by that mode of conveyance. The trams make frequent changes of mules and a stop of one hour at Rinconada for dinner. They toil wearily up long hills and run rapidly down steep inclines and around some sharp curves. The road is built through tropical jungles, and forests filled with the most brilliant orchids. The banana, orange, cocoanut palm and other tropical fruit-trees abound. Frequent views of the gulf are to be obtained and the mountain range on the west — the Sierra Madre — is in full view all the way, dominated by the beautiful, snow-capped cone of Orizaba. Yet to any one but an enthusiastic sight-seer the ride must be monotonous and extremely tiresome.

[1] Continued from No. 668, page 173.

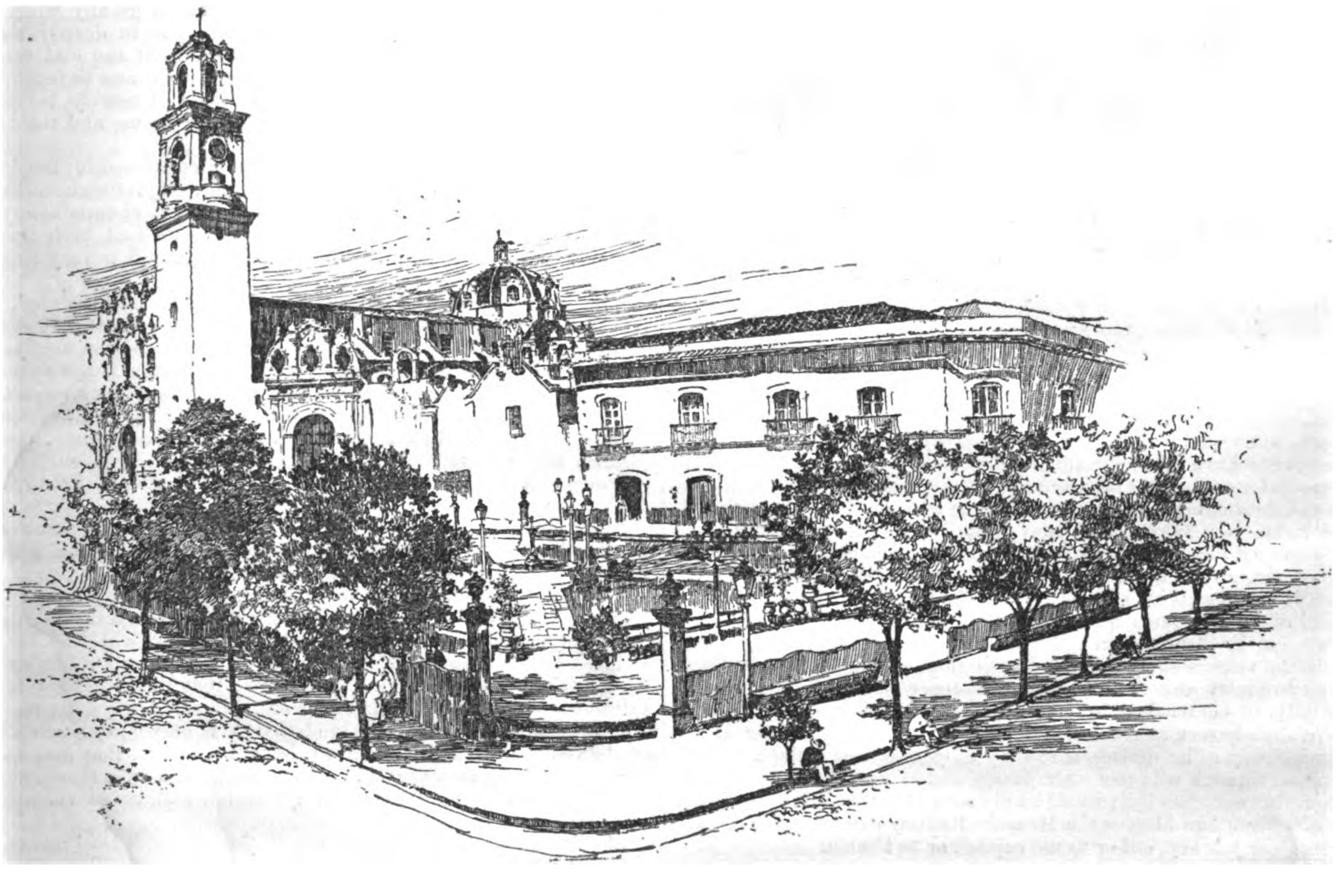
The traveller is given the choice of two cars in which to make the journey. The first-class car is cushioned and therefore more comfortable than the second-class, but both are equally exposed to dust which is apt to be excessive. The mail is carried in the second-class car, which is consequently under guard of four soldiers. The guard is changed at the dinner-station to obviate the necessity of unacclimated soldiers of the mountains spending a night in Vera Cruz and *vice versa*. Such frequent and sudden changes of climate as the guards upon these railway trains and trams would have to undergo were not this plan pursued would soon result disastrously to the Mexican army.

The track follows most of the way the old highway from Jalapa to Mexico built by the Spaniards soon after the Conquest, traces of which remain and may be seen in substantial bridges and in solid walls of masonry supporting the roadway. One of the bridges — a very picturesque one — has given the name of *Puente Nacional*, National Bridge, to one of the stations on the road.

Jalapa has not been so isolated and secluded as to avoid participation in the turbulent history of the Mexican Republic, particularly as it was the birthplace and home of Mexico's greatest political schemer, General Antonio Lopez de Santa Ana, whose career began with the Independence of Mexico, in 1821, and closed in 1876. His ranch, to which he often retired to concoct new schemes for the gratification of his almost insatiable ambition, is one of the points of interest along the route.

When the patience of the traveller, even the most enthusiastic, is well-nigh exhausted, the tram makes a turn around a hill and comes out in full view of the town of Jalapa. It is built upon a number of hills, its streets so steep and irregular, that the tram-car, which runs through it by a series of wide curves, is the only vehicle possible there. The buildings are white, with roofs of red drain-tile. Everything is scrupulously clean, and cleanliness is not generally considered a prominent characteristic of a Mexican town. The houses are of the Spanish style, the windows nearly on a level with the pavement, but protected by iron gratings. In the centre of the city stands the immense Church of San Francisco, once a convent, erected by the Spanish conquerors, and apparently designed to fulfil a military as well as a religious mission. From the traveller's first point of view, the other buildings of the town appear to be nestled around the church as if for protection. On all sides rise blue mountains. On the west is the *Cofre de Perote*, — a chest-like mass of porphyry. The beauty of the scene is enhanced by the verdure of the mountain sides and by the cool summit of Orizaba overlooking the whole.

In the town itself the spotless white of the buildings is relieved by the brilliant green of the graceful tropical foliage. Over each white wall hangs a broad banana leaf. From each enclosure towers a cocoanut palm. The buildings present an almost endless variety of form. Every picturesque feature of architecture is to be found; buttresses, flying-buttresses, oriels, arches, towers, turrets, pinnacles, domes, — all in artistic confusion. Those artists who have recently



Church of San Francisco, in the Main Plaza, Jalapa, Mexico.

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illustrated the cities of Spain and Northern Italy might have obtained all they desired in Jalapa. But if an artist were to visit Jalapa he would never be willing to leave. Jalapa is the capital of the State of Vera Cruz. Its public buildings, State and municipal, are of comparatively recent construction, and conform to the substantial simplicity which characterizes such buildings throughout Mexico.

A curious feature to be noted in the architecture of Jalapa is that floors are made to conform more or less to the slopes of the hills on which they are built. I first noticed this in the Church of San Francisco, where the floor rises gradually from the front entrance to the chancel rail. I afterwards noticed the same thing at my hotel, with its strange effect upon the furniture in my room.

Jalapa is called by its citizens the "Garden" and the "Paradise of Mexico"; and many are the proverbs which attest the beauty of

the Jalapenas,—the women of that city. They are blondes, a style much admired by the other Mexicans who are very dark. The Jalapenas have fair hair and eyes of light brown or blue. Their complexions may have been rendered more brilliant by the peculiarities of their climate. They are said to be descended from Andalusian colonists—the fairest and most beautiful of the Spaniards. In appearance they are more English than Spanish, and upon meeting the daughters of my landlady, they looked so thoroughly English that it was something of a surprise to find them unable to speak a word of my own language. During my visit in Jalapa I heard not a word of English spoken.

If the visitors choose to spend more than one day in Jalapa there are two pretty little Indian villages Jilotepec and Cuautepec in the vicinity, to be reached by tramway and well worth a visit. If he have already seen as much of the magnificent scenery of the Mexican Railway as he desires, a ride by *diligencia* from Jalapa to San Marcos, through wild mountain passes, and scenery rivalling that of the railway in grandeur, would amply repay for the fatigue incident to it. From San Marcos the Mexican Railway can be taken for the rest of the journey, either to the capital, or to Puebla.

Arthur Howard Noll.

THE COURT-HOUSE. — MUSEUM OF FINE ARTS EXTENSION.—THE ALGONQUIN CLUB-HOUSE. — OTHER NEW BUILDINGS. — SPLIT-FACE STONEWORK. — THE CRISPUS ATTUCKS MONUMENT.

It has been several months since the last notice of work in Boston was written, and in the meantime much of the work then in process of erection has gone on or been completed, and new work commenced. The usual amount of unkempt dwelling or apartment-house façades have sprung up in a night, but little worthy of notice if it were not for the fact that they show the exaggeration of the peculiarities of better work, and so accent an eccentricity that it becomes a vice. This is sometimes to be taken as a warning, for a parody will often be the best criticism of an original; and, by virtue of their manifest unsightliness, it might be well to consider if arched entrances off centres (where no other openings have arches), squat semi-detached columns, and too heavy split-face lintels and voussoirs might not, with advantage, be discarded altogether.

Amongst public buildings, the Court-House has gone on steadily, simplified considerably from the original design, and has gained in consequence. It is impossible to overcome the heavy dulness of the first story, or the unfortunate consoles and balconies of the end pavilions; but the long Pemberton Square arcade has a certain dignity about it, and the openings above the cornice are now in scale with the rest of the building, which they would not have been if left in threes as proposed.

The Museum of Fine Arts is nearly ready for the roof. The mullions seem thin, but this may be helped by the sashes, and the simplicity of the work is a great advance over the frippery of the older building.

The Algonquin Club has had its opening reception, and the interior is very successful. As usual, there are minor criticisms which can be made, but, as these are of so small matters there can well be a difference of opinion about them, such criticism can be classed as individual opinion merely, and not as based upon anything more permanent or irrefragable. For instance the reading-room, which is a very fine room, with a beautiful ceiling, looked better and had greater scale when the walls were white behind the dark oak columns, than since they have been covered with dark red, into which the columns sink. This will be improved greatly when the ceiling, which is now only tinted, is picked out in deeper color. The triple-fireplace motive (the Poictiers motive) at the end of the dining-room, fine as this marble end is, needs more and richer detail about each fireplace. Three holes in a sheet of marble is hardly enough to give the effect desired. The ladies' rooms and the card-rooms are especially successful.

Hastings-Hall, at Cambridge, has its walls completed of the long, speckled brick, which is becoming so familiar. This brick varies in its general tone and color, and in this case is not as satisfactory as that used in the Andrew house. The effect of the hall, built around two sides of a rectangle, promises to be excellent. It is very simple, and good in consequence.

The Boston & Providence station at Roxbury is completed. It occupies a peculiarly shaped triangular lot, but even this does not justify quite so much picturesqueness of form as has been used here. Divisions of a small building into picturesque masses is apt to make the result petty — even a large building will not stand picturesqueness all along the line at regular intervals, as Street's London Law Courts plainly exemplify. Picturesqueness in details or in spots, if one pleases, but a governing mass underneath, a body of more compactness than the arms and legs. This the Boston & Providence station has not.

The Fisk Building, on State Street, presents a simple, frank and effective façade. The mouldings of the string-courses look a little heavy-handed, not too large — but maladroit.

The Niles Building, on School Street, repeats the old story of split-face work, which is getting to be a mere set of spots of broken light and shade on so many buildings. How long will it be before architects understand that split-face work is a bastard thing, something between dressed-work and carving; that it will always be of a different color from the dressed-work, and will always depreciate the value of adjacent carving, and that it is only good when used as the dominant-surface in the whole building; and that Mr. Richardson, master as he was of it, found it, at times, a most troublesome thing. Used in small surfaces or quantities, nothing so vulgarizes and cheapens a building.

The narrow façade of Ohio-stone, farther down School Street, is an example of what Classic work can become, if detailed without special study and deprived of a cornice.

The building at the corner of Park Square, on the site of Mr. Hunt's old studio, is also finished, and is, perhaps, the thinnest, most papery piece of work in the city. As for the pediments over the windows, a sense of pity for their impoverished, flattened existence, is the only emotion produced on the mind. This building is manifestly a good investment.

The large building, next the New York & New England depot, is to be congratulated upon its color.

The State-House dome, which had taken a color to artists most agreeable, has been favored with a new coat of very yellow gold, and the fence has been painted orange, probably as a novel color — no other reason suggests itself.

The Crispus Attucks Monument is completed, and is a piece of work designed for one point of view only, placed where it can be seen from all sides. The result is what might be expected. It, also, has the usual patchiness of bronze upon light stone, an effect which never seems to occur to sculptors modelling in clay — until it becomes a matter of speculation whether they have any sense of color. The figure is pseudo-Classic, with a smack of Bavaria — a little melo-dramatic, but better than much that is within stone's throw; but the eagle is, manifestly, ill at ease, as well it may be, having nothing to do with the composition.

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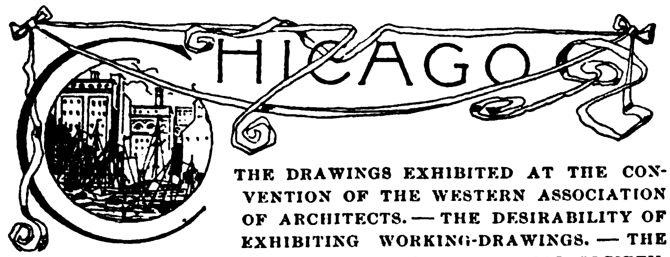

THE DRAWINGS EXHIBITED AT THE CONVENTION OF THE WESTERN ASSOCIATION OF ARCHITECTS. — THE DESIRABILITY OF EXHIBITING WORKING-DRAWINGS. — THE COMPETITION FOR THE NEW BUILDING OF HISTORICAL SOCIETY.

OF course the most important event in the architectural world here during the past month has been the annual meeting of the Western Association of Architects. The speeches made and the work accomplished have already been so fully and widely reported as to need no comment or enlarging upon here, but it may not be out of the way to jot down a few personal impressions of the proceedings and to notice some of the minor details which do not seem as yet to have appeared in print.

The weather during the convention was fine for the season of the year, and allowed of considerable sight-seeing, so that the building operations of Chicago, and vicinity were quite thoroughly examined.

The room of assembly, although not as handsome as the Literary Club Rooms in the Art Institute, where the American Institute of Architects held its session at the annual convention last year, was still most convenient, being large, light and easy of access, upon the ground-floor of the hotel where the majority of the delegates had rooms. Most of the arrangements of the committees seem to have been well made and successfully carried out to the general satisfaction of the members, but as is usually the case, those whose work passed off smoothly received but little credit, thanks, attention or criticism, while others who may have worked much harder, but whose labors did not come up to the self-imposed standard of some persons, are either justly or unjustly blamed. Upon entering the hall where the sessions were held one's attention was immediately attracted by the numerous drawings on the wall, and naturally the first thought was, how entertaining this would be, but after the first cursory view it was, to many, very disappointing. As an exhibit intended only for architects it can safely be said to have been scarcely ideal: for while, as a matter of course, architects are interested in perspectives of buildings and at such a display would very naturally expect to see more of such drawings than plain elevations, still their interest would centre almost as much in seeing the various methods of rendering, as in the actual form of the building itself, which most members of the profession are perfectly capable to judge of from the geometrical elevation; the finished perspective as a rule only being made for the laity. But to see, as in this collection, absolutely nothing but perspective without the sketchiest intimation of the interior arrangement, becomes as uninteresting as the conversation of an inveterate punster, and almost as devoid of practical utility. There were some fifty of these productions in frames: perspectives from every natural and unnatural (mostly the latter) point-of-view; perspectives in pen-and-ink; perspectives in monochrome, but most notably perspectives in colors that could not by any possibility exist, and consequently perspectives that could only give the most false impressions. There were the wonderful effects in purple, reds and oranges, with wonderful shadows coming from nowhere; and there were the perspectives representing buildings in the centre of a vast expanse with the point-of-sight an eighth of a mile away, and the horizon line in the second story, while in reality these buildings when executed would be on a narrow street crowded between other buildings so they could only be seen under very different circumstances. In fact all the old "tricks of the trade" for the client's benefit were here "on tap." With the exception of one or two really unusually clever things, the drawings in pen-and-ink, though not numerous, far surpassed those in color; but after studying the different methods of rendering, the most satisfactory perspectives were the photographs, and the few displayed probably attracted more real study than most of the other drawings. The exhibit represented, what it was probably impossible to avoid, the work of only a comparatively small number of architects and from few cities; but there does not seem to be any good reason why among this number there should not have been a single plan or a set of working-drawings. A complete set of designs of even a small dwelling or a common store would have been a perfect mine of pleasure to nine-tenths of the delegates. Few architects are fortunate enough to often have immense buildings, costing hundreds of thousands of dollars, but all will have many times a year moderate cost residences, and it must always be a pleasure and undoubtedly often a profit to see how others have met the same general requirements, and at the same time to see and examine the methods of office-work that a set of drawings show. Also, nearly every one would be glad to see a few full-size details and larger working-drawings, even of the simple parts, while if to these a perspective or fine photograph could be added, then so much the better as forming a complete study of the artistic parts and at the same time showing the office methods, the practical and unartistic side of the profession. Naturally any one architect alone would dislike to display a set of working and full-size drawings, battered, torn and dirty, and have them surrounded by brilliant colored perspectives in gorgeous frames, but if those who were particularly requested would do it, there should be no embarrassment, for it is no secret that, after going through the usage necessary to put up a building, a set of original plans and elevations (which often are not even inked in) is not a very artistic sight to behold; but in this case it is not entirely the artistic side in them that one is looking after, but more the practical side and the resolution of the practical questions involved, and it would seem that if the committee had asked each architect for some one set of working-drawings of a building, finished within, say, the last ten months, and had even suggested some one building known to them, or the particular class of building desired, that for architects a much more entertaining and interesting exhibit would have been the result, for it might have included all classes of work from the largest commercial buildings to the most modest cottage, all with plans, elevations and constructional drawings.

The only part of the proceedings where there was anything approaching excitement was at the election of officers, and here it was caused by what appeared to many as an effort to force a certain candidate upon the convention by heading both tickets with one name. As a result, when a member not on the committee of nominations had the courage to place the name of another party before the convention it was received with evident satisfaction, and the result of the balloting which showed his election was productive of considerable excitement.

On the Monday evening before the convention, the Chicago Architectural Sketch-Club held its annual banquet and exhibition of work done during the past year. There were more than two hundred numbers in the neatly-printed catalogue, and a very great majority of the subjects were landscape in water-color — a class of work to which the Club seems to have especially devoted itself in the last twelve months. Most of the sketches showed considerable ability, while the work of two or three of the members was especially praiseworthy. As remarked, very many of the works were upon subjects so far removed from architecture as to make it scarcely seem the work of an architectural sketch-club, but to those tied down in office-hours to strictly professional subjects a little relaxation in this direction is undoubtedly extremely advantageous.

During the past month, the results of a competition that seems to have had something of a "go-as-you-please" character have been exhibited to the public at the rooms of the Historical Society on Dearborn Avenue, and it is apropos of this display that a late number of one of the Eastern architectural publications remarked: "The Historical Society is about to select plans from *several hundred* in competition." Whether "several hundred" be a misprint or not, it certainly is a biting piece of sarcasm. Consider the fathers of the Historical Society wildly examining several (say four) hundred sets of plans! and then think of the fact that not one of them was paid for! ! However, it was not quite so bad as that, for the facts seem to be as follows: The Society owns a large and valuable corner-lot, upon which the members are anxious to erect a building, and up to this point all parties seem to be agreed, but beyond that there is no such thing as harmony. But, just the same, designs have been asked for, not formally by the Building-Committee, with certain requirements to be filled by all at a given scale, but different members of the committee have worked up their own pet schemes with certain architects, who, so far as can be learned, take their chances without pay. There have been four competitors, — all members of the American Institute of Architects, which would certainly make it look as if the subject of professional etiquette needed a thorough shaking up. So far as can be discovered, this competition is about as bad as it is possible to imagine. There was no programme of requirements, no fixed scale and method of rendering drawings, no particular drawings required, and no competent jury, nor any promise of one, while all designs are shown to the public before any award can be made. Moreover, the Society as yet only have something like sixty thousand dollars pledged, and a portion of that is a bequest requiring to have a special building or wing of its own; while it is more than doubtful if any one of the designs could be built absolutely fireproof, as demanded, for twice or three times that sum, and, so far as a cursory examination would permit one to judge, only one design could possibly be built in sections, as money is subscribed, and still have anything like a finished air, or give any prominence to the portion supposed to be built by the legacy referred to. As a matter of course, the perspectives received almost exclusive attention and, also as a matter of course, the largest and most brilliantly colored ones were the most favorably commented upon.

That the outcome of such an exhibit will be of no earthly good to the profession or to the public is evident, for the Society is now practically as far from knowing what is wanted as before, and at the same time is under at least moral obligations to several different architects; but the committee, apparently, is much like all other committees of the kind, composed of gentlemen of no professional experience, but possessed of great ideas of their own abilities to judge architecture, since they have been extremely successful in doing something else which has no relation to architecture. Certainly, if we in America ever hope to equal in our public buildings those of foreign countries, the committee must do as the foreigners are willing to do — ask the assistance of disinterested, but educated architects, who have had experience in judging drawings, both from an artistic and a practical point of view, and are not to be mislead by false or over-colored perspectives. If a competition is necessary, why can it not be arranged with some reference to the feelings of the profession, to the advantage of the Society, and the general edu-

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cation of the public? In such a Society there must certainly be on the list of membership some scholarly architect of modern education, who would be willing to assist the committee and help it judge intelligently; but, if any assistance were required, most likely the committee would greatly prefer to ask "practical men," who usually possess nearer the minimum of real knowledge than any one else.

The Illustrations

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

ENTRANCE TO THE "BERKSHIRE" APARTMENT-HOUSE, MADISON AVENUE, NEW YORK, N. Y. MR. CARL PFEIFFER, ARCHITECT.

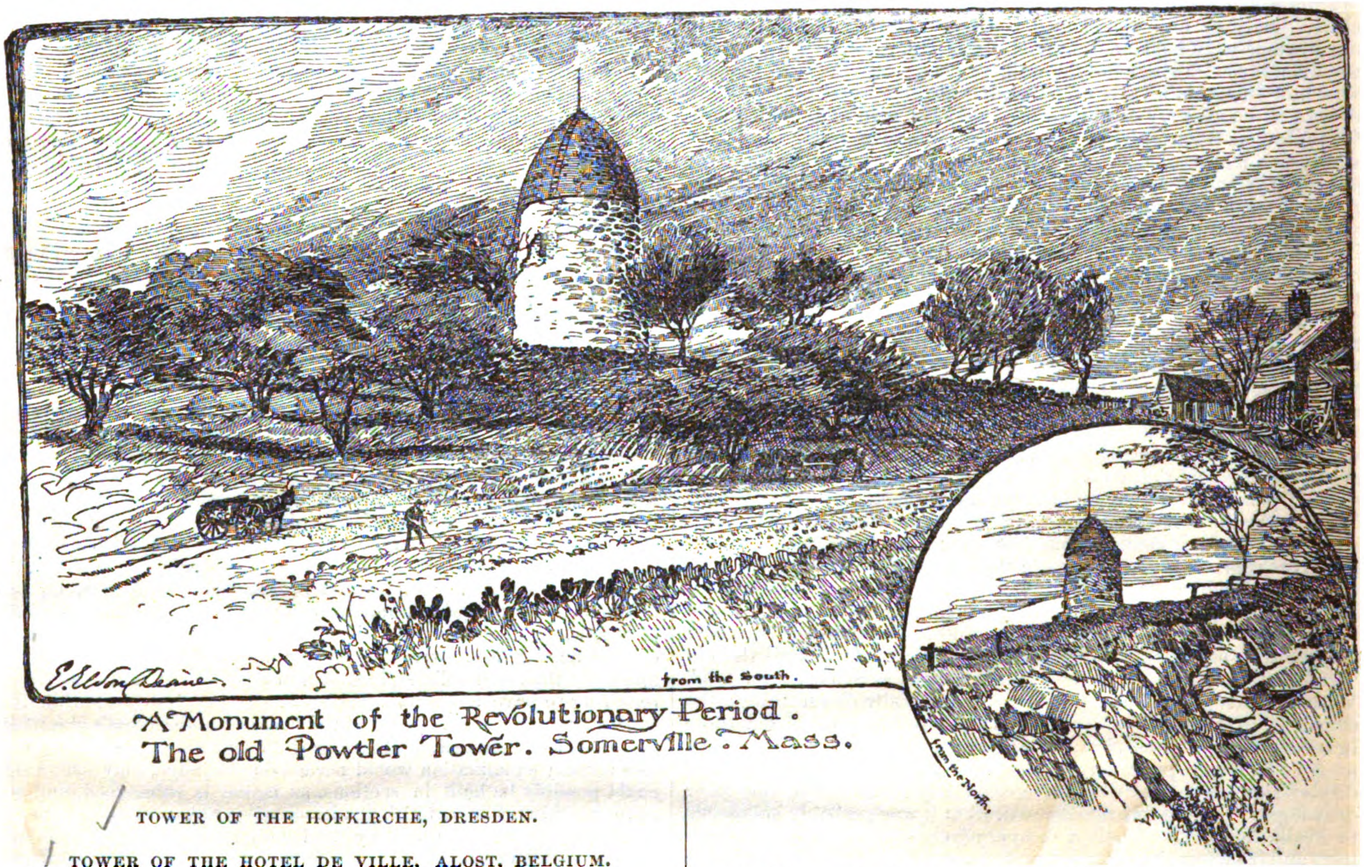
[Helio-chrome, issued only with the Imperial Edition.]

GOTHIC TOWERS AND SPIRES, PLATES 34, 35 AND 36.—ST. LAWRENCE'S, STANWICK; ALL SAINTS', WICKHAM-MARKET; ST. MARY'S, CASTLEGATE, YORK; ST. STEPHEN'S, BRISTOL; ST. WOLFRANS, GRANTHAM.

[Issued only with the Imperial Edition.]

CANCER HOSPITAL, NEW YORK, N. Y. MR. C. C. HAIGHT, ARCHITECT, NEW YORK, N. Y.

TOWER OF ST. CHARLES BORROMEO, ANTWERP, BELGIUM.



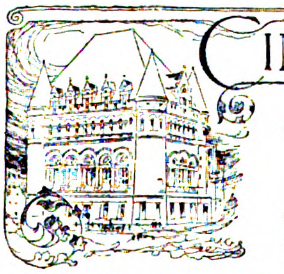
A Monument of the Revolutionary Period. The old Powder Tower. Somerville, Mass.

TOWER OF THE HOFKIRCHE, DRESDEN.

TOWER OF THE HOTEL DE VILLE, ALOST, BELGIUM.

AN ENGLISH COTTAGE.

Cincinnati.



THE YEAR'S WORK.—THE CHAMBER OF COMMERCE.—THE NEW CITY-HALL.—RECENT COMPETITIONS.

THE building season of 1888 just drawing to a close has been a somewhat peculiar one in several respects. It will be remembered in the first place as being in a general way one of the dullest years of the decade. The general complaint of all architects has been lack of work of a local nature. Notwithstanding the general dulness, the year will be remembered as the year in which the Chamber of Commerce, by Richardson, was erected: this building is now about completed and the date of dedication has been set for January 29, 1889. The façades are familiar to the readers of the *American Architect* and so a description will add nothing; suffice it to say that the building is eminently satisfactory in an architectural way, and every part seems to have been carefully studied out and the building has, moreover, been erected with care and great dispatch by the contractors, Messrs. Norcross Brothers.

The year will also be remembered, architecturally, from the fact that the new City-Hall was commenced. This building is in charge of Samuel Hannaford & Sons, architects, and is now above the street line. It is located on the square bounded by Central Avenue, Plum Street, Eighth and Ninth Streets: the building is to cost $700,000 and will rank high among the architectural monuments of the country.

Besides these two large buildings the only armory ever erected in this city was begun this year and is now nearing completion.

There is generally an element that can be relied upon to fill up the measure of dull years and that is work in small towns within a radius of two hundred miles tributary to Cincinnati, and this element has been a very considerable one this year and perhaps larger than usual. In this class of work the architect has really a better opportunity than in regular city work. There is not so much trouble getting your full commission, and you are allowed to have your own way more than you do in regular city practice; especially is this so from the fact that your client is quite remote and therefore cannot drop in on you at unseemly moments and propound all sorts of questions and make architectural suggestions that are past finding out. Take it altogether your out-of-town client is to be cultivated, as he has to take what is sent him, and is content to accept his architect's advice as he is very desirous of having his building as much metropolitan as the money will allow, and so it is that one will often find in towns of 3,000 to 10,000 inhabitants more real architectural merit proportionately than will be found in the larger cities.

The feeling and outlook for the coming year is unusually good and unless some untoward event takes place the season will be an unusually busy one. We already hear of three important corners to be improved and of considerable work for the "hill-top" as well as in the valley beneath.

Cincinnati has had several architectural competitions during the past year and whether or not they are beneficial to the profession is a question to be considered. Of course the successful competitor will maintain that competitions are all right, and that the owner gets the benefit of the concentrated wisdom of all competitors who are willing to enter the arena of unremunerated services.

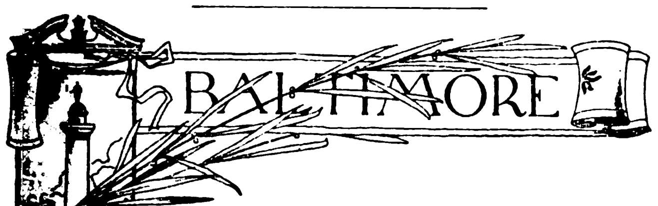
The first competition of note was the Chamber of Commerce (this was really last year, but we will count it in this year) and this competition was fairly well conducted, was in the hands of a fair-minded, honorable committee, but it was well-known that they had for the

most part a predjudicial leaning toward a Richardsonian monument; and notwithstanding that the competition was hedged about by *noms-de-plume* it is hard to believe but that big dinners, wine-suppers, carriage-drives and entertainments will count for something, especially if the giver of them is backed up with a fine design and well-rendered drawings; of course, if a man has all these elements and advantages he is just that much ahead of his more unfortunate fellows, and if a splendid building (somewhat deficient in light but in most other respects all that could be expected) is the result, why should not all the disappointed competitors proclaim, as it were from the house-tops, that the architectural competition is *not* a failure but is a consummation devoutly to be wished; especially should they so proclaim it, as a tub was thrown to five of the whales in the shape of $500.00 each for the privilege of being beaten, as it were, by a forgone conclusion. Do not infer that any injustice was done the unsuccessful competitors by the honorable gentlemen of the committee, as we are all agreed that they selected, without doubt, the best plan submitted. But would not the result have been the same if the successful competitor had been selected without the formality of a competition? Now count up the actual money expended, to say nothing of time and heartaches, and decide for yourselves whether or no architectural competitions are a failure. But while you are making up your mind on this point do not hesitate to go into the very next one that offers, for you might win and that would aid you in deciding that architectural competition is not a failure.

The next competition of note was the new City-Hall now hoisting its head above the dirt of the cellar. This competition was not as fairly conducted as the other one, at least not to the competitors, for there were no tubs thrown out to the whales great or small, but it was a free for all, go as you please, catch as catch can sort of an affair, but it nevertheless had its votaries. Common fame (which is, of course, to be relied on at all times) says that this competition was as much decided on before as after the decision was made.

Next was the Armory competition which was distinguished above its fellows in one particular at least, *i. e.* one of the commissioners openly and candidly informed one who offered himself as a lamb to be slaughtered upon the architectural altar, that be had no information for any one except a certain architect (naming him), and who afterwards proved the successful one. In this case as in the others a good building is being erected, and who is so bold as to say that it is not better than it would have been had not the competition taken place. A recent competition — the Mount Auburn Presbyterian Church — a building to cost $40,000, was in charge of a committee consisting of lawyers and merchants, and this like the others was decided — so says our friend common fame — before *the* decision was reached; the committee asked for plans and obtained ten sets of sketches before they were sure that any could be executed.

Let each one of us brush away the cobwebs of our memory and see how many competitions have been successfully and justly awarded and then decide whether or no architectural competition is a failure.



CHURCHES. — THE NEW BUILDING OF THE METHODISTS ON ST. PAUL STREET. — THE WOMAN'S COLLEGE BUILDINGS. — THE BENNETT MEMORIAL. — THE SECULARIZING OF RELIGIOUS BUILDINGS.

IN using the word "church" we may not ignore the fact that there are many thousands of people in the Christian world who deny that the term may be rightfully applied, from an architectural point of view, to any building that is not at least a modified form of either the ancient basilica or the Gothic cathedral, or from a religious point of view, to any other form of worship than that practised by those who hold strictly to the doctrine of an unbroken Apostolic succession, if not indeed to the still narrower limits of those alone who acknowledge allegiance to the Church of Rome. To the rest of the world are permitted synagogues, chapels, temples, meeting-houses, congregations and societies, of any architecture, of any form of worship, but no "churches."

To this by no means small minority of Christian people it possibly seems not only a misnomer but almost a profanation to apply the word "church" to such a building as that very recently completed by the Methodists on St. Paul and Third Streets in this city, where in the general scheme not only have some of the most important of the usually accepted essentials been entirely omitted, but other forms and details have been added, forcibly recalling strictly secular usages.

The general impression of the exterior is of a grouping of two amphitheatres of different dimensions, meeting at a common diameter line, and a great square tower, one hundred and eighty-six feet high, crude in its severe simplicity and boldness, and bearing but little relation to either campanile or spire, together with various smaller subordinate features of somewhat domestic aspect. The interior strongly suggests the conventional idea of the concert or lecture hall, if not the theatre, and no detail of sacred emblem is conspicuous, if even anywhere visible about the building. Notwithstanding what one who had never seen it might naturally infer from this outline description, we will state at once that Messrs. McKim, Mead & White have undoubtedly succeeded in producing a building which, though open to criticism in some points, is, in its massiveness and simplicity, deeply impressive, and which to the majority of men will suggest a church and only a church, and (with a due consideration for the somewhat complex practical requirements) even on the interior the careful treatment of details has resulted in a feeling that is eminently religious. This fact received a somewhat practical demonstration very recently when a public meeting, merely for a special benevolent object, was held in the building. The audience assembled in reverential silence, and the proceedings seemingly almost involuntarily, under the influence of the surroundings, assumed a religious character. The view of the exterior is familiar to readers of the *American Architect* where a gelatine print of it was shown a short time ago. It is very severe Romanesque in design, in local gray stone and granite, with no detail of carving or ornamentation of any sort, all the effect coming from very frankly trusting the massing and proportions to take care of themselves. The mass of red-tiled roof and extinguisher-shaped cap to the tower give a tone of color that would otherwise be much needed; while the terrace on the south side, with its heavy retaining-wall and broad granite steps, adds much to the dignity and imposing effect. The point at which the tower approaches the main building, the manner in which the several forms of the roof join each other, and the half columns of smoothly-dressed granite at the ends of the arcades, built in sections and merely placed against the rough wall behind them, but in no way tied to the construction or forming any part of it, are not the best points of the design. This last defect almost leads one to imagine that it was owing to some error or oversight in carrying out the work rather than that it could be a part of the architects' original conception.

The church with the buildings and grounds of the Woman's College, when completed, will occupy two blocks on St. Paul Street, from Third to Fifth Streets; those already nearly completed being the Bennett Memorial Hall for the physical culture of women — also by McKim, Mead & White — and the College building proper, the latter by a different architect, and, while following the general scheme, showing a different hand in the design. The good effects obtained, however, in the whole group of buildings by the frank and consistent abandoning of all exterior ornamentation, simply as such, is very satisfactory.[1] At the Episcopal Church, for example, two blocks below, and still only partially completed, the architects are probably grateful to the kindly offices of the Virginia creeper and Japanese ivy in covering the details of some ten years ago, which, if made to-day, we fancy would be quite different.

The Bennett Memorial, though small, has much character and interest in its simplicity. It covers a little over four thousand square feet, and was erected at a cost of about $35,000. It contains, besides a main hall, to be fitted up with all the most improved appliances for gymnastic exercises, a large swimming-pool, a bowling-alley, a walking-track, and various other smaller departments, all in charge of a young woman, who, as Professor of Physical Culture, has been perfecting her studies in the various methods taught in similar schools in Europe. It is proposed in the future to add a library, a chemical and physical laboratory, a music-hall, and an art department.[2]

In one of the addresses at the inauguration, on November 13, it was truly said "that the state of liberal education in this country during the last thirty years has shown a great progress in two directions — the development of universities and the establishment of colleges for women."

It is, however, the treatment of the interior of the auditorium of the church itself that is, perhaps, the most interesting feature architecturally of the whole. The form is approximately that of an ellipse, with long and short diameters about eighty-four and fifty feet respectively. The pulpit and platform, with gallery and organ over it, are placed at one end of the ellipse, the rest of the space being arranged as an amphitheatre surrounded by a gallery, and the light is chiefly obtained by high windows disposed in a colonnade of flat pilasters, treated as a deep frieze around the room. The gallery, organ, etc., are of black birch-wood, with columns, pilasters, balustrade, etc., of Doric or Ionic details. The walls, floor-covering, and seats are all of deep red, the walls relieved only by some stencilled classic details in dull gold, and the entire colonnade of the frieze is also of dull gold. The ceiling is a flat dome in pale blue, apparently rising from behind the cornice that crowns the whole, and upon it are placed with mathematical accuracy, it is asserted, all the visible stars of heaven as they appear on a certain night and at a certain hour. The whole is lighted at night by a continuous and closely-placed band of gas-jets on top of the cornice.

Without regarding the matter in any way from a denominational point of view, one might say that the revival of active interest in church construction in the nineteenth — a reaction from the proverbial lethargy of the eighteenth — century seems to have progressed

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[1] A result much to be aimed at, in preference to any exterior carving, unless of special appropriateness in application and merit in execution.

[2] This Woman's College owes its existence chiefly to the generous endowment of the Rev. B. F. Goucher, who is also rector of the church.

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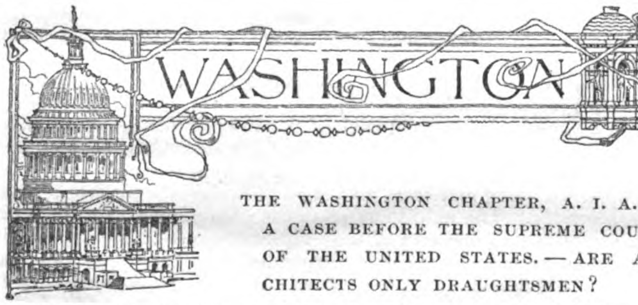
upon two quite diverging lines. The one might be termed the exclusive, the other the inclusive. The one shows an increasing tendency to emphasize the distinct parts of the building, as recalled from the tradition of more ancient customs, marking the special uses to which they are appropriated and the relative sacred character assigned to each, from the nave, the choir, the chancel, the sanctuary, to the altar itself. Those officiating in the services are more and more separated from the people. All that can conduce to the effectual performance of the rituals is more carefully considered than is the convenient disposition of a large congregation for hearing or taking part in the services. One reason that has been asserted for this is that the age is again ripe for receiving impressions and religious instruction through object-teaching. Hand-in-hand with the rapid progress of modern art comes the richest adornment of the interiors, centring in elaborate details about the chancel and altar. But equally rich and elaborate, and with the same materials and processes, has become the interior decoration of both public buildings and private houses, even to the details of costly textile stuffs and art needle-work, and no distinction of kind or degree is any longer apparent, except in the application of the forms of certain sacred emblems, often so small in scale as to be lost in the general impression produced, and all this often under the care and control of those whose daily life is apparently not distinctly separated from the frivolities, or, indeed, from the graver evils of the world. Great religious ceremonials should be and might be exceptionally grand. As a rule, they are not so.

The other line of development is altogether from the congregational point of view. Not only is there a great auditorium, but departments for charity-work, and even for social and convivial reunions, are given prominent places either under the very roof of the church, or else made conspicuous in the general plan; while every appliance that can add to the convenience and comfort of the congregation, even such as are closely associated with buildings appropriated to distinctly non-sacred uses, are availed of and given important consideration. The building tends to become essentially secular and domestic — to be the great meeting-house of a society more or less religious, benevolent, and social in its objects.

Regarded, therefore, from either line of development, the church edifice of to-day, of whatever denomination, does not seem in many points to be exceptionally exalted above all other buildings as the great sacred temple devoted to the glory and worship of the Deity.

He would, perhaps, be no false prophet who would declare that the religion of the next century, now closely pressing upon us, will not admit as its conception of a "church" anything narrowed by the definitions and dogmas of the Romanish, the Episcopalian, the Methodist or the Unitarian, but will demand only a great Christian temple, where sectarian differences will be resolved into mere superficial matters of form and taste and expediency, accidents, as it were, of government, of locality, or other material conditions. If we might venture to picture such a great temple, we would say it will be, architecturally, the most important and the most beautiful building of each community. Such was the temple of ancient religions now dead and of the Middle Ages. Modern Christianity will not do less than they. Its materials will be the richest, the rarest, the most durable the earth can produce; its construction based on truth without a single sham; its architect the greatest artist in the land; its ritual comprehensible in its simplicity, imposing in its grandeur; its worshippers all humanity; its divinity the God of the universe.



THE WASHINGTON CHAPTER, A. I. A.— A CASE BEFORE THE SUPREME COURT OF THE UNITED STATES.— ARE ARCHITECTS ONLY DRAUGHTSMEN?

THE Washington Chapter of the American Institute of Architects at its October meeting elected the following officers: Adolph Cluss, President; W. M. Poindexter, Vice-President; C. A. Didden, Treasurer; Glenn Brown, Secretary. Committee on Admissions: C. H. Read, Jr., J. R. Marshall, O. Von Nerta. This Chapter has been in a thriving condition since its organization in September, 1888. It was consulted by the District Commissioners when the building regulations of the city were remodelled last spring. It made an effort to have Congress insert a notice clause in the District Lien Law, without success. Questions of interest to the profession are discussed with considerable zeal at the different meetings. On the first of January the Chapter will have its own meeting-room at 906 F Street, where the Chapter will be pleased to see other members of the Institute who may be in the city.

Recently my attention was called to a legal case decided by the Supreme Court of the United States on appeal, when the Court allowed the five per cent commission as the ordinary professional rate.

For the protection of the Freedmen, Congress created a Board of Trustees for Colored Public Schools: a portion of the taxes were allowed them to build and maintain such schools. Mr. Adolph Cluss was employed by this Board, and received in payment a voucher for his fees. The Board kept its accounts with the Freedman's Bank, and as the Bank was in the habit of cashing such vouchers at a discount, the architect got his voucher cashed by the Bank. When the District Commissioners were substituted as the ruling authorities in the city, the Board of Audit threw this voucher out, and Mr. Cluss was called on by the Bank to bring a suit against the District.

The District, pleaded extortion in the charges, and other technical reasons why the bill should not be paid.

Mr. Justice Field delivered the opinion of the Court.

"In 1870 the Board of Trustees of the Colored Schools for the District of Columbia employed the plaintiff, who, is an architect by profession, to prepare the plans and specification for a school-house in Washington, and to superintend its construction, agreeing to give him for his services *five per cent on the cost* of the building. This was the *ordinary rate of charge for compensation* for similar services in the District. In 1872 the building was constructed, and cost, about $60,000. The Board of Trustees approved of the work and paid the plaintiff $1,100 in cash, and gave him a voucher for $2,155 more, being for superintending repairs upon other buildings. This voucher the plaintiff sold and delivered to the Freedman's Savings and Trust Company, for whose benefit this action is brought.

"The Board of Trustees of Colored Schools has since been abolished and a new board organized to take charge of all the public schools, whether of white or colored children. But when the original board existed, it was the agent of the District for the purposes entrusted to it, and could bind the District for the services rendered by the plaintiff. The building constructed, and the other buildings upon which the repairs were made under his superintendence, belong to the District, and are used by it for colored schools; yet, the amount due him for which the voucher was given, has never been paid. The jury were of opinion that the District should pay it, and we agree with them.

"The disallowance of the claim by the Board of Audit, if such had been allowed to be proved, would not have concluded the plaintiff. That Board was not a judicial body, whose action was final; it exercised little more than the functions of an accountant. A claim allowed by it was not necessarily a valid one; a claim disallowed was not, therefore, illegal. Its action either way left the matter open for contestation in the courts.

"Though the contract of the plaintiff with the Board of Trustees was made before the act creating the District into one municipal corporation, the work was not completed until afterwards, when it was accepted and approved. The new corporation succeeded to the property of the two former ones, and also to their liabilities. — Judgment affirmed."

There seems to be a persistent effort made by the engineer clique in this city to belittle the constructive and business capacity of the architectural profession; their idea is that the architect should confine himself to the draughting-board, apparently forgetting that the essence of a good design is in proper proportion according to, and use of, constructive necessities. The fact is that engineers are very deficient in the details of building-construction, and in all the little things that go to make a good building. The army engineers have proved themselves very inefficient in their conduct of the Washington Aqueduct Tunnel. If they are not capable under conditions where they should be more or less perfect, why should they be placed in charge of the Congressional Library and other public buildings where it could not be expected that they would be efficient.

I quote an extract showing the opinion Mr. Green, civil engineer, has of the duties of an architect. He was recently appointed Superintendent of the Congressional Library under Mr. Smithmeyer, and continues under General Casey, and is, apparently, considered an authority by Congress.

His ideas were brought out in a statement made before the Committee on Appropriation, in these terms. Questions by Senator Hale; answers, Mr. Green:

"Q. — From whom do you take your instructions, if I may call them so? A. — From the Commission generally. I am under the architect, but we have not our duty very well defined yet. The idea is that I shall have charge of the outside work entirely of the construction, but the architect makes the plans and I get what I can from him. The Commission has never given me any definite instructions where I shall begin or leave off. They have rather wished to let matters go along smoothly without undertaking to define very accurately what our relative duties shall be.

"Q. — That has got to be done some time? A. — Yes sir; it must be done some time. There should be one head of the whole business. There should be a *superintendent* and *engineer of construction*, who is *everything* but the designer and architect. Then the responsibility of the style of the building would be with the architect, and the responsibility as to strength and economy and quality of construction and business management would be with the superintending engineer."

[1] This case can be found in "*United States Reports — Supreme Court*," Vol. 103. Cases argued and adjudicated in the Supreme Court of the United States, October term, 1880. Reported by W. J. Otto, Vol. 13, page 705. Little, Brown & Co., Boston.

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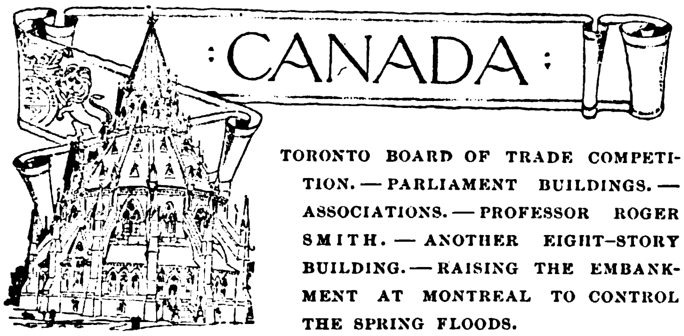
It seems strange that such statements should be accepted without comment by our legislators, showing, as it does by their action, a tacit agreement with the assumption. All should know that without the combination of design, construction and business management, the architectural art would soon deteriorate into pure draughtsmanship, and poor draughtsmanship at that. The architect who originates should certainly have charge of construction.



TORONTO BOARD OF TRADE COMPETITION. — PARLIAMENT BUILDINGS. — ASSOCIATIONS. — PROFESSOR ROGER SMITH. — ANOTHER EIGHT-STORY BUILDING. — RAISING THE EMBANKMENT AT MONTREAL TO CONTROL THE SPRING FLOODS.

NO decision has, at the time of writing, been reached by the Property Committee of the Board of Trade for the City of Toronto, as to the design they will accept for their new building. It is over two months since the drawings in competition were sent in, and fully four weeks since Professor Ware returned them with his report, selecting three from which the committee should finally make their choice. Many meetings have been held by the committee, some of four hours' duration, and the deferred decision has raised the interest of the population generally. Out of sixty applications twenty designs were sent in, and of these, it is reported, twelve were from the States. Various reports have appeared in the daily papers of the "feelings" of the members of the committee concerning this or that design; but, a few days ago they were all flatly contradicted by the secretary, who gave no hint as to the real state of the matter. But things will leak out, and there is a rumor, apparently founded substantially, that the authors of the designs are known, and that the choice lies between an American and a Canadian firm. However, those interested can live in hope, and wire-pullers, if there are any, must go on pulling.

There is a rising feeling of indignation in the profession generally, against the architect who has the building for the Ontario Provincial Parliament Building in hand. As the mass rises, even the public begin to fear that, after all, their building will not be so much to look at, except as to size, as they hoped. A cheap print has been published of the design, which, like all cheap prints, cannot be expected to do justice; but, the design is one very meagre in conception, so much so that even a good print would hardly improve its appearance, and it does not of itself do justice to the importance of the building.

American architects certainly have not shown to advantage in Canada. Their designs, as a rule, have been poor and, apparently, hurriedly considered. Toronto and Montreal have examples of American talent on exhibition. The great building for the New York Life Assurance Company, in Montreal, eight stories high above ground-level, has a most stunted appearance, as if it were afraid of knocking its roof against the clouds. It looks as if it had been subjected to compression under a steam-hammer, every story flattened out as much as possible. These proprietors have met with some kindness on the part of the Corporation, who were not slow to utilize the citizens' money to please so wealthy a society. The basements of this building go down 30 feet below the street-level, and consequently are far below the level of the drains of the streets on which it faces. Happily for them, a hundred yards to the north there is a street, Craig Street, 50 feet at least below the level of Place D'Armes Square. The Corporation courteously constructed another drain to connect with the Craig Street sewer, to enable this Life Assurance Company to have water in their basements. Even corporations bow low before "the man with a gold ring." The house in Toronto which was built of white brick and white stone dressings, and to which I alluded some time ago, is, now it is finished, something absurd; no other word is really so suitable. It was to have produced a "new effect," but the "new effect" of white brick and white stone did not answer apparently, for it was painted red all over. A child could hardly have drawn a more miserable building; it looks like the first production of a pupil. On the roof have been stuck meaningless globes or balls of ungainly proportions by way of finials that have caused some speculation among well-meaning neighbors, anxious to give even "the devil his due" as to what they could be there for. They are so large and awkward as to attract the attention of even ordinary citizens, who are not supposed to know much about the "correctness of things."

There seems to be a general feeling in the principal places of Ontario, that there should be some kind of amalgamation of the profession. A letter from an Ottawa architect calls upon all the architects of the Province to join hands, and suggests that the architects of Toronto take the lead. The Toronto Architectural Guild, now consisting of some 30 members, and which from a social gathering is rapidly becoming an influential professional body, may already be said to have taken the lead; and there is little doubt that with this feeling abroad we may expect to see, at no great distance of time, some rapid developments towards the formation of a more general association. The wish of the Minister of Education for the Province to found a chair of architecture will, no doubt, give a stimulus in this direction.

The Province of Quebec, however, will not come in for any advantages gained by this proposed associating of the Ontario men. Indeed, it is doubtful when they will learn wisdom, for certainly nothing could be more childish than the jealousy existing between the various firms in Montreal. The difference of nationalities, no doubt, has something to do with it; but even those of the same race and nation keep as much aloof as if there were poison in each other's touch.

It is curious to notice how one or another firm of architects gets all the principal work in Montreal each year, to the exclusion of other firms. A few years ago one firm, not particularly well-known previously, suddenly found itself called upon to execute houses for more than one millionnaire, hotels and public buildings, and nobody else had anything in particular to carry out. Last year another firm had all the work, and in the season just ending, the same thing has happened. Of course, this leads every one to hope his turn will come soon, and raises the hopes of flagging spirits.

I am sure that it is a matter of considerable satisfaction to those who take any interest in the professional education of young students, to be able to read word for word the admirable lecture of Professor Roger Smith, at the University College, London, as published in the *American Architect* on this subject. Years ago I had the satisfaction of attending his lectures. He is one of those genial, kind-hearted gentlemen, whose heart is in his subject, and who is never tired of making matters clear to his hearers and elucidating any passages that may possibly have been misunderstood. In a word, he is the very man for students — thoroughly understanding the difficulties which beset them, and always ready to give his kindly advice to those who ask it. A point in his advice to students, published in the No. 673 of this paper, deserves particular notice, and students of all ages should take it to heart. It is that "even copying a letter, making a tracing or entering a message in a call-book is a lesson, if the pupil chooses to learn from it." We have all noticed the tendency of pupils to look glum when asked to do any simple thing which they consider it "not their place to do," and cases sometimes come under our notice where an architect more or less of the Pecksniffian order gives his pupils too much of this kind of thing — to the exclusion of more important opportunities of learning; but, it will be better for a great many pupils to remember these words of the Professor's, and act accordingly.

The Royal Insurance Company, Montreal, not content with the rentals of their present building in Place D'Armes Square, are about to put to a pretty severe test the stability of the present walls and foundations. Montreal not being a particularly earthquakey district, and the building being a substantial and solid one of four or five stories, it is intended to add four new stories, with elevators to reach them by, making another tower for this little Square.

For the safety of the public, it is to be hoped the architect who has the work in hand will make a very thorough and exhaustive examination of the building as it stands, before proceeding with the work. When the extensive alterations to the Bank of Montreal, in the same city, were carried out a couple of years ago, the back wall of the building, having a total height of nearly 80 feet, although three feet thick was very little more than an inner and outer shell well bonded together, but with the middle filled up with stone-chippings: the quality of the mortar was so bad that at the time, 40 years after it was built, there was no adhesion between the stones, and they were loose. The whole wall had gone over (about two inches at the worst part), but there were no signs of further movement. This shows what great caution should be taken before heavy additions are made to old buildings. I might add another discovery that was made in connection with this wall, which is also a warning. As the wall went over, it drew with it the floor-joists that were built into it, for there was no spiking done originally to secure the joists to the beams into which they were mortised, over the large area of the banking-room; the mortises of these joists were about two-and-one-half inches deep, with tongues to correspond, and the tongues or tenons were drawn out of the mortises until they only rested on the beams one-quarter of an inch! To these joists a heavy panelled plaster-ceiling was secured, so that the timely discovery probably averted a very serious accident.

The Corporation of the City of Montreal, together with the Dominion Government, after many experiments, appear to have arrived at last at a definite and apparently successful scheme for preventing the annual spring floods. The surplus water in the spring is a "terror" to deal with, and the cost of the works contemplated will be very great. At summer-level the water of the river is some fifteen feet below the wharves and steamboat piers, and on these wharves, every spring, the different steamboat lines have their freight-sheds; freight-cars are run on permanent tracks from the railway companies' stations; the steamboat companies put up their fences and ticket-offices, and the whole river front on the wharf-level is crowded with merchandise. At a distance of a couple of hundred feet or so back from the edge of the wharves rises the stone river-wall, another 15 feet or 18 feet, on the top of which is the roadway all along the front of the city, with a slight iron balustrade of

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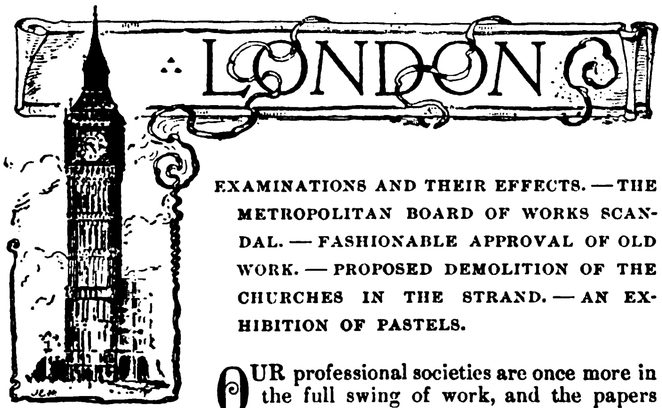
stancheons, or posts set in sockets on the top of the wall. As the winter season approaches, freight-sheds, freight-cars, fences, offices, etc., even the iron railing just mentioned, thirty feet or more above the river, are removed, and the scene is changed to desolation and dreariness. The winter sets in, and gradually the floating masses of ice on the rising surface of the great St. Lawrence get jammed together, and in time the river is frozen up. The massive piers of the Victoria Bridge catch the ice, and it piles up, freezes together, and freezes down deep below the surface till a solid wall of ice is formed, in some years sufficient to change the Lachine Rapids to a smooth and level sheet of water. What with extra water and the accumulation of ice, the wharves are buried deep, and the surface is but a few inches below the edge of the revetement-wall. Spring comes on, and the daily question is, how long will the ice-bridge stand against the tremendous weight of water on its upper side? In an instant, crash upon crash, an awful roar, and the tearing and grinding mass of ice rushes down, heaping up, washing over the river-wall, driving far up into the streets, and the water of the river bursts all restraints and, flooding the lower parts of the city to the first floors, invades the upper streets, and soon forms them into canals averaging four feet deep. As a last experiment, a great embankment was raised along the top of the revetement-wall some six feet high, posts were sunk deep into the ground, cross-beams were laid, and the whole space filled in with earth, presenting a sloping face towards the river ten feet wide, and rising vertically from the roadway on the inside. Last winter this proved sufficient to keep out the river, and for the coming season it has been determined to keep the channel open, by means of dynamite, as long as possible, and if the embankment answers the purpose next spring it will be removed and a stone wall will take its place. The winter before last (1886–7), the river rose forty-four feet above summer-level.



EXAMINATIONS AND THEIR EFFECTS. — THE METROPOLITAN BOARD OF WORKS SCANDAL. — FASHIONABLE APPROVAL OF OLD WORK. — PROPOSED DEMOLITION OF THE CHURCHES IN THE STRAND. — AN EXHIBITION OF PASTELS.

OUR professional societies are once more in the full swing of work, and the papers are once more filled with reports of speeches more or less tedious, delivered by all sorts of men on all sorts of subjects. You remember I told you, in one of my former letters, that the new President of the Royal Institute of British Architects was Mr. Alfred Waterhouse, R. A., a gentleman who holds, perhaps, the first place among our English contemporary architects. There was a very good attendance at the opening meeting, which was as enthusiastic as the dignity of the members present permitted it to be. Mr. Waterhouse, in his speech, did not suggest any new or startling reforms, but contented himself with a general retrospect, incidentally giving utterance to his ideas on certain debatable points as he passed on. He referred with great satisfaction to the fact that the numbers of the candidates for the compulsory examination for the Associateship of the Institute showed a very appreciable increase year by year, and gave it as his opinion that the course pursued by the Institute in establishing this examination was far more likely to conduce to the welfare of the profession than any hastily-conceived registration schemes. This will doubtless be the case in London and other great cities, for there large bodies of students are wont to congregate, and the sight of other men preparing for an examination has a very stirring effect on their comrades who would fain seek repose. Besides, it is becoming necessary for architects to pass this examination, and I personally know of two cases where men have scoffed at the examination, but, finding that the fact of their not being members of the Institute severely handicapped them in the race of life, they yielded to the inevitable, and are now busy preparing for the next examination. So you can see from all this that the Institute only wants time to virtually achieve "registration" of a much higher and nobler type than was attempted by the memorable bill of last spring. What I am afraid of is that the new radical "Society" will strive its utmost to force the Institute's hands: even an attempt in this direction cannot but have a lamentable result, and, as it is pretty certain to be made, it is the opinion of a certain section of the Institute members that some action in the direction of a compulsory examination of the whole profession ought to be made. Whether this be so or not, it will be necessary for the Royal Institute of British Architects to be strictly on the alert. The very commendable idea of holding examinations in the provinces is being actively followed up, and one will shortly be conducted at Liverpool.

Among the other matters which Mr. Waterhouse referred to were the constitution of the new County Councils under the Local Government Act, the progress of the Imperial Institute buildings, the vexatious restrictions with regard to compensation for interfering with rights of light, the recently-published biographies of G. E. Street and H. H. Richardson, and other questions of interest to English architects at the present time. A very significant reference was made to the Board of Works scandals in the Presidential address, the following noteworthy and strikingly applicable extract from Mr. Whichcord's (a former President) address being given:

"Architects may be elected members of that Board just as barristers, solicitors, and doctors may be so elected. It would be ridiculous to say that professional men shall not sit at that Board because they may have had a pecuniary interest in some of its building transactions. But I shall run no risk of censure when I say that a Fellow or an Associate of this Institute, if he be elected a member of the Metropolitan Board of Works, ought not, from that moment, to have any professional connection whatever with the purchase of land offered for sale or lease by the Board; nor should he be professionally engaged in the superintendence of buildings to be erected on land which is the property of rate-payers, whose agent and representative he is."

The Commissioners of the Board have issued an interim report, in which the conduct of Alderman Saunders, about whom I have told you some little anecdotes in my previous letters, and a brother professional, Mr. Fowler, is condemned in unmistakable terms; although the Commissioners find that, except in one instance, there is no evidence to show that the fact of their having been professionally employed caused them to act at the Board in a manner different from that they might otherwise have adopted. The verdict was, however, quite strong enough to cause the Institute to publicly expel Alderman Saunders from its ranks, Mr. Fowler not being a member (so I understand), and it is a noteworthy fact that the *City Press*, the semi-official organ of the City of London, regarded this expulsion as more important than the action of the Commission itself. It has been a matter of no little comment in the City that Alderman Saunders has deemed it advisable to cling to his official position in the corporation in the face of the evidence that has been disclosed. A public appeal was made to him to resign in to-day's *City Press*, but, in case he does not see his way to take action, the Court of Aldermen have referred the matter to their Privilege Committee for an obvious purpose.

The Commission otherwise, I am glad to say, acquits the members of the Board from any direct cognizance of the irregularities which were taking place among certain officials, but condemns strongly the system under which such irregularities were possible. This must not be taken, however, as the final report, but simply one issued at a certain stage of the proceedings, to prevent too long a period of time elapsing between the evidence and the verdict.

The Board of Works now is drawing near its end, and it will soon be superseded by the new London County Council, created under the provisions of the Local Government Bill.

Mr. Appleton, the new President of the Architectural Association, as was his wont, gave his audience something to think about. As you know we architects in England are so dreadfully conservative. You doubtless remember the anecdote of a party of architects on tour visiting a fine church in one of the outlying districts which had recently undergone the process of restoration. Our searchers for the beautiful were charmed by a certain window which was covered with lichens and moss, and really exquisite in form and in proportion. It must be sketched, was the verdict, and sketched it duly was. On the other side of the church was another window exactly similar to its brother, but, sad to relate, it was new! "Look," said some one, as he passed by, "what a shame it is to put such a window in such a church as this. The architect might at least have tried to catch the spirit of the old work." Then a sorrowful tear trickled down from the traceried head of the neglected one at these hard words. "Why am *I* so treated," it sadly seemed to say, "when we are exactly alike in every respect." "Why am I called 'such a window?'" Ah, little window, you seem to forget; you may be exactly like your brother, but your crime is not that: you are new, and nobody has the bad taste to admire anything new. Millais said that the great allies of the old masters were time and varnish, and a parallel alliance might not be difficult to find for our art. And yet, notwithstanding this feeling, our architects do not go to old examples for their inspiration; they guiltily look up the back numbers of the professional papers and thence get their ideas. Now, said Mr. Appleton, why not do this in the open; why not admit publicly that the study of the works of modern architects is a potent factor in the conception of modern architectural designs; and why not give up the practice of liking or pretending to like a thing just because it is old and gray. Judge architecture from its intrinsic merit, and not from its age; and if a piece of design strikes your fancy, and a neophyte suggests that it might with advantage be sketched, refrain from smiling in a lofty way and saying: "Oh, we don't sketch *new* work." Perhaps you in America, where architecture is altogether a comparatively modern development, will hardly appreciate the depth of the feeling that Mr. Appleton is contending against; but it does exist, and exists strongly in our English offices. I am glad to say that the Presidential address met with a far more favorable reception than the President expected, and will doubtless do a great deal of good, provided that it does not give rise to reactionary sentiments.

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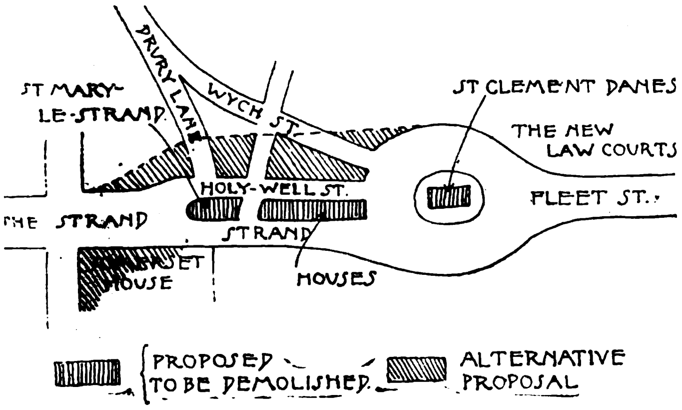
The Society of Architects gave their annual Conversazione at the Arts and Crafts Exhibition last week. I did not attend, but judging from reports it seemed to have fulfilled its promoters' expectations.

Two new theatres have been recently opened in London and two others are in course of erection. It is difficult to see how they are to pay in the present state of London theatre life, but the proprietors of course, know best. At the Shaftesbury, recently, the patent iron fireproof curtain proved refractory and would not go up. Under these circumstances the performance would not have been appreciated and consequently it did not take place. These erratic performances of fireproof curtains are certainly to be deprecated from the managers' point-of-view, not to mention the audience's, and patentees would do well to bear this fact in mind.

The everlasting controversy about the demolition of the two churches in the Strand has been again set on foot by an appeal of the Rector of St. Mary-le-Strand for funds to put his church in order.

The Strand.

The *Daily Telegraph* immediately took up the parable and published a leading article declaring that if the rector had asked for subscriptions for pulling down his church and carting it away, he would be far more likely to meet with a generous response. Many of my readers doubtless know the locality, but for the benefit of those who do not I send a rough sketch of the district in question.



The Strand and Fleet Street form together one of our two great arteries connecting the City and the West End, and the traffic is consequently enormous. Both the streets are fairly wide and fairly straight, but their connection is to a certain extent blocked by a row of some dozen or so tumble-down shops flanked at either side by two good-sized churches, called St. Mary-le-Strand and St. Clement Danes, each of which stands out almost in the centre of the street. This obstruction causes a sudden diminution in the width of the roadway, and leads to numberless blocks of passing vehicular traffic, which cannot be denied to be a great nuisance, especially when regarded from the point-of-view of the omnibus-driver or casual passer-by. But while this personage's claims must receive full attention, we must not forget that we should have but little beauty and picturesque effect in our streets if his clamorous demands were always yielded to. There is no doubt that a curved street is infinitely more interesting and picturesque than one in a rigid straight line, and however much critics may carp at the architectural merits of the church, it at least possesses some dignity and forms a fitting finish to the view down the Strand, which would be entirely lost if it were bodily cleared away. I earnestly hope that the London County Council will consider this matter very seriously when it comes to deal with it, and if they do, I feel sure that the alternative proposal of removing the rookeries on the north side of the assailed churches will commend itself to them as a judicious solution of the difficult problem.

The winter exhibition at the Grosvenor Gallery is of a rather peculiar nature. It is an exhibition of pastels, and from its novelty has been attracting an unusual amount of attention. It has been stated that this is the first time that pastels have ever been publicly exhibited in this country, but I believe this is hardly the case. Mr. Whistler at one time collected a number of these particular works of art for this purpose, and one or two other minor exhibitions have taken place. Sir Coutts Lindsay has, however, far surpassed in a numerical sense all previous efforts. Pastel-painting, as you know, is a somewhat new movement, and has taken permanent root in France rather than in England, indeed, a society for the purpose of encouraging this particular form of art has been formed in Paris and many eminent artists are members of it.

The great fault, to my mind, of pastel-painting is its want of permanence. The colored crayons are apt at any time to be removed from the drawing, and I believe I am correct in saying that the material is apt to flake off leaving great white patches. Under these circumstances we can hardly hope to see any real masterpieces executed in this material, at all events, not until some reliable "fixatif" has been discovered. Yet it is to be hoped that this difficulty may be surmounted, as the material possesses a wonderful softness in tone, lending itself in an eminent degree to portrait painting and similar works of art, and moreover the artist can get an excellent effect with but a tithe of the labor he would have to bestow upon an oil-painting.

Alderman Saunders, the erring architect — member of the Board of Works, tendered his resignation to his constituents this morning, but at their request consented to reconsider his decision.

CHIEL.

London, November 22, 1888.

SUGGESTIONS FOR THE CONDUCT OF ARCHITECTURAL COMPETITIONS.[1]

EMPLOYMENT OF ARCHITECTS. — COMPETITIONS.

THE best way to obtain good results in the design and construction of any building is to employ a competent architect outright, choosing him in the same manner that experts in other professions are chosen: on the ground of general or special fitness for the proposed service, as shown by his character and education, his knowledge of the constructional and decorative arts, and his business-capacity and training; these qualifications to be ascertained by investigation, examination of his executed works, and his reputation with competent judges.

If, for imperative reasons, this course cannot be pursued by the committee or others having in charge the erection of a public building, and a competition is considered necessary, it is for the interest of all parties that it should be so conducted that the best men shall take part; that they shall be encouraged to do their best; that the best they offer shall be selected, and that the author of the successful design shall be employed as architect on the usual terms; provided the building is built and he is competent. To insure such results it is necessary that the conditions shall be clear and adequate, and alike for all, and that there be absolutely fair play in judging the designs and in awarding the work, and that the decision shall rest in the hands of competent persons.

The following paragraphs contain practical suggestions for securing the best results in competitions:

OPEN OR PUBLIC. SECTION I. — ADVICE.

1. It is absolutely essential to a successful issue that the projectors of a competition should employ a competent architect as adviser, and he should be named in the advertisements and conditions. The adviser should neither be a competitor for the work, nor should he in any event have any professional interest therein, except that he should receive from the projectors a proper fee for his services.

The duties of the adviser should be:

(*a*) To aid the projectors to make a clear and definite statement of their wants, and to draw up proper terms to regulate the competition.

(*b*) To select from all offered the designs which conform to the terms of the competition, and to reject all others.

(*c*) To advise the projectors on the relative merits of the designs admitted to the competition.

SECTION II. — CONDITIONS.

1. In a public or open competition, it should be clearly stated whether or not the invitation to compete is issued by parties having authority to employ an architect and erect a building.

2. The number and scale of drawings required should be distinctly stated, and they should not be more in number nor to a larger scale than necessary to clearly explain the design. If perspective views are required, they should be taken from a fixed point of view and distance, and be uniform in size, number, and mode of rendering, without imaginary accessories, and with no shadows except of the building itself.

3. The absolute requirements of the building should be fully stated, but a distinction should be made between those conditions that are imperative and those which are simply advisory, and the terms should be such as to hamper the judgment of the competitors as little as possible.

[1] A tract issued by the Boston Society of Architects, December, 1888.

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If any limit of cost is set, it should be clearly stated what is to be included in it.

4. A type-written description of the building should accompany each set of drawings, which should give as clearly as possible such information as cannot be shown on the drawings concerning materials, methods of construction and decoration.

No writing should be allowed on the drawings.

5. Each drawing and the description should be distinguished only by a motto or device, which should be repeated on the outside of a sealed envelope containing the author's name and address.

6. No alternative designs or other drawings than those called for by the conditions should be received or considered.

7. The time for preparing the design should be made long enough for adequate study of the problem and the proper preparation of the necessary drawings and description, and proper allowance should also be made for the ordinary occupations of competitors.

If possible, the time for rendering the decision should also be stated.

8. A design should be excluded from a competition:

(*a*) If any attempt is made by its author, directly or indirectly, to disclose his identity or to influence the decision of the projectors or their adviser.

(*b*) If sent in after the limit of time named in the conditions.

(*c*) If in any particular it violates the conditions as already stated.

(*d*) If it exceeds the limit of site.

(*e*) If, after its cost has been estimated by the adviser, or by an experienced contractor employed by the projectors to estimate on all the designs, it shall be found that its probable cost will exceed the limit named in the conditions by more than twenty per cent.

9. It is advisable that all the designs admitted to the competition should, with the consent of the authors, be publicly exhibited after the final award.

The decision of the projectors should be announced at or before the time of exhibition.

10. The work, if carried out in any shape, should be placed in the hands of the architect selected under the terms of the competition, and at the usual rate of compensation (five per cent on the full cost of the building). But if, on the disclosure of the names, the successful competitor should prove to have had slight experience in building, the right may be served to associate with him a consulting architect, to whom a proper proportion of the fees shall be assigned. But in event of the reservation of either or both of these rights it should be clearly stated in the conditions; as such reservation would inevitably tend to deter architects of position from entering the competition.

11. In an open competition prizes should be awarded aggregating not less than two per cent on the proposed cost of the building.

12. As all drawings are the property of the architect, those of the unsuccessful competitors should be promptly returned as soon as the award is determined. The projectors to be furnished with complete copies of all premiated designs. Rejected designs should only be used, in whole or in part, by agreement with and compensation to their authors.

SECTION III. CLOSE, OR PRIVATE COMPETITIONS.

1. Close, or private competitions are always preferable to open, or public ones, from which they differ in that the architects to take part are selected for their supposed special fitness for the projected work. In these competitions the names of the competitors are usually known in connection with their designs, and it is customary to consult them in the preparation of the conditions, and to pay to each unsuccessful one a fee in accordance with the importance of the building and the amount of work required from each; giving the execution of the work outright to the successful competitor on the usual terms.

A professional adviser may profitably be employed in these competitions also if the number of competitors is large.

PROFESSIONAL PRACTICE AND CHARGES, AS APPROVED BY THE BOSTON SOCIETY OF ARCHITECTS.

1. For full professional services, except as hereinafter mentioned, the customary charge is five per cent on the total cost of the works executed from the architect's design.

2. For works of less value than $10,000, and for alterations, a special charge in excess of the above is made.

3. For monumental work, and for all works in which the expenditure is mainly for skilled and artistic labor, as fittings and furniture, decoration, sculpture, stained-glass, or the like, and for selection of stuffs and other materials, the architect's charge is regulated by special circumstances and conditions.

4. When several similar but distinct buildings are erected at the same time from a single specification and one set of drawings, and under one contract, the commission is charged on the cost of one such building, and a special charge is made in respect to the others.

5. The commission is reckoned on the total cost of the work, including all permanent fixtures necessary to render it fit for occupation, and as if executed of new materials.

6. In case preliminary sketches only are prepared, the charge is one per cent of the estimated cost.

7. In case of the abandonment of a project after the drawings and specifications have been prepared, the charge is in proportion to the work done, and is at least one-half of the full commission.

8. If material alterations in the drawings are made by the direction of the client, the additional charge is in proportion to the work done.

9. The architect is entitled to payments on account, one-half of the commission on estimated cost at the signing of contracts or the beginning of the work, and other payments successively as the work progresses.

10. Full professional services include: Preliminary studies, working-drawings and specifications in duplicate, general supervision, examining and passing accounts.

11. All necessary travelling expenses are to be paid by the client.

12. Drawings and specifications are the instruments of service, and the property of the architect.

SUPERVISION OF WORKS.

13. The supervision or superintendence of an architect (as distinguished from the continuous personal superintendence which may be secured by the employment of a clerk-of-the-works) means such inspection by the architect, or his deputy, of a building or other work in process of erection, completion, or alteration as he finds necessary to ascertain whether it is being executed in conformity with his designs and specifications, or directions, and to enable him to decide when the successive instalments or payments provided for in the contract or agreement are due or payable. He is to determine in constructive emergencies, to order necessary changes, and to define the true intent and meaning of the drawings and specification, and he has authority to stop the progress of the work and order its removal when not in accordance with them.

CLERK-OF-THE-WORKS.

14. On all buildings of considerable importance it is for the advantage of the owner or owners to have constant superintendence by a clerk-of-the-works, in addition to the regular and necessary supervision of the architect; the remuneration of said clerk to be paid by the owner or owners, in addition to any commissions or fees due the architect. The selection or dismissal of the clerk-of-the-works is to be subject to the approval of the architect.

Edward C. Cabot, *President*.

Arthur G Everett, *Secretary*.
60 Devonshire Street, Boston.

TRADE SURVEYS

A quiet consolidation of commercial and manufacturing interests is progressing. The railway interests are making vigorous efforts in the same direction. Since the Interstate Commerce Commission took hold 56 railroads have declined in value $221,000,000; though it is not intimated that the two facts have any necessary connection. The spirit of organization will grow during the coming year for a variety of reasons. The ever-present danger of excessive competiton and over-production will compel manufacturing, railroad and all other interests into a closer unification of interests, or, at least, at efforts in that direction; all the straws are pointing to this result everywhere. A small one shows itself at Savannah, where Georgia and Florida lumbermen held a sort of convention to organize the pine interests of the South Atlantic States. A syndicate will control the annual output of 400,000,000 feet of lumber. A Southern Pine Exchange will be formed, and prices will be controlled in the interest of better prices for both; a fact which Northern users of yellow-pine might wisely make note of before the opening of next year. Business in lumber is improving rapidly at lake ports. At Tonawanda receipts from all points for the past year foot up 548,000,000, against 531,000,000 last year. At all lake ports an increased business has been done over last year, and in the far West a distribution of Northern and Southern lumber is roughly estimated at 25 to 33 per cent in excess of last season. The supply of hardwood is increasing in all markets, but not in excess of the apparent requirements. Lumber manufacturers and dealers in all markets, North and South, are able to report an unusually active season; and, in a general way, stronger prices than were realized last year, notwithstanding the great increase in output. Something like a building boom continues throughout the West; the greatest activity showing itself at Kansas City. Everything points to a renewal of manufacturing and building enterprise throughout the entire region of country between Duluth and El Paso. During the past thirty days makers of mining-machinery have booked some large orders. Rail-makers have, within thirty days, booked orders for 100,000 tons. Prices are still low, but are pointing upward. The combination is fighting with more serious difficulties than ever before beset them; the chief one is the enormous producing-capacity with which demand does not keep pace. In other branches of the iron trade there is a fair activity, although orders are not crowding capacity. During the first quarter of next year large orders will be placed for ships, cars, boats and shipping-mill machinery. Some ship-yards have work ahead for from one to two years. A barge-line will probably be established, which will run between Pittsburgh, Nashville, St. Louis, St. Paul and intermediate points. It is believed by a great many that the time has about come when a profitable inland traffic by river can be established; and that considerable of the traffic now controlled by railroads can be diverted to the river lines. The demand for iron ore is greater than any former year. Nearly all blast-furnace interests who use Lake Superior ores have about decided to make large season contracts during January and February lest prices will harden. The year just closing has been the best year that anthracite-producers ever had. The production foots up, in round figures, 38,500,000 tons. Upwards of $3,000,000 is being expended in improving and extending facilities for both mining and shipping. The increased Western shipments this year over last year foot up nearly three quarters of a million tons. A proportionately large increase has been made to Southern points.

The Western demand for anthracite is gaining, and it is supplying the bituminous and block coals of Western States. The Pennsylvania Railroad Company has just placed one order for 1,500 cars, and other companies are about placing orders which will increase the car-builders' work for the winter by 3,500 cars. Within the past thirty days, railroad-building contracts amounting in all to between $5,000,000 and $6,000,000 have been heard of. Within that time railroad-building requirements for about 700 miles have been projected Important railroad-building schemes are in contemplation in Mexico by which the existing rail-connections will be extended 300 miles farther south, and which, when completed, will shorten the time from Europe and New York to South America and Pacific from a week to ten days for the former, and from four to five days for the latter. Quite a number of short lines are projected in a dozen different States, all aiming at local traffic. Notwithstanding all the talk in financial and railroad circles about the disagreements for the railroad-building next year, a great deal of work will be done. An increase will be forced by actual traffic facilities, existing lines and systems. The interior of the country is rapidly filling up. Hundreds of new cities are springing up; hundreds of little communities are in need of railroad facilities, and the extensions will be made. The strongest sources of activity are overlooked by the average newspaper writers and trade writers. The little industrial requirements, the hundreds and thousands of little shops, the thousands of small houses, and the multifarious requirements of shops, factories, and mines will, in the aggregate, create a demand for supplies of material to which railroad-building owes fresh impetus.

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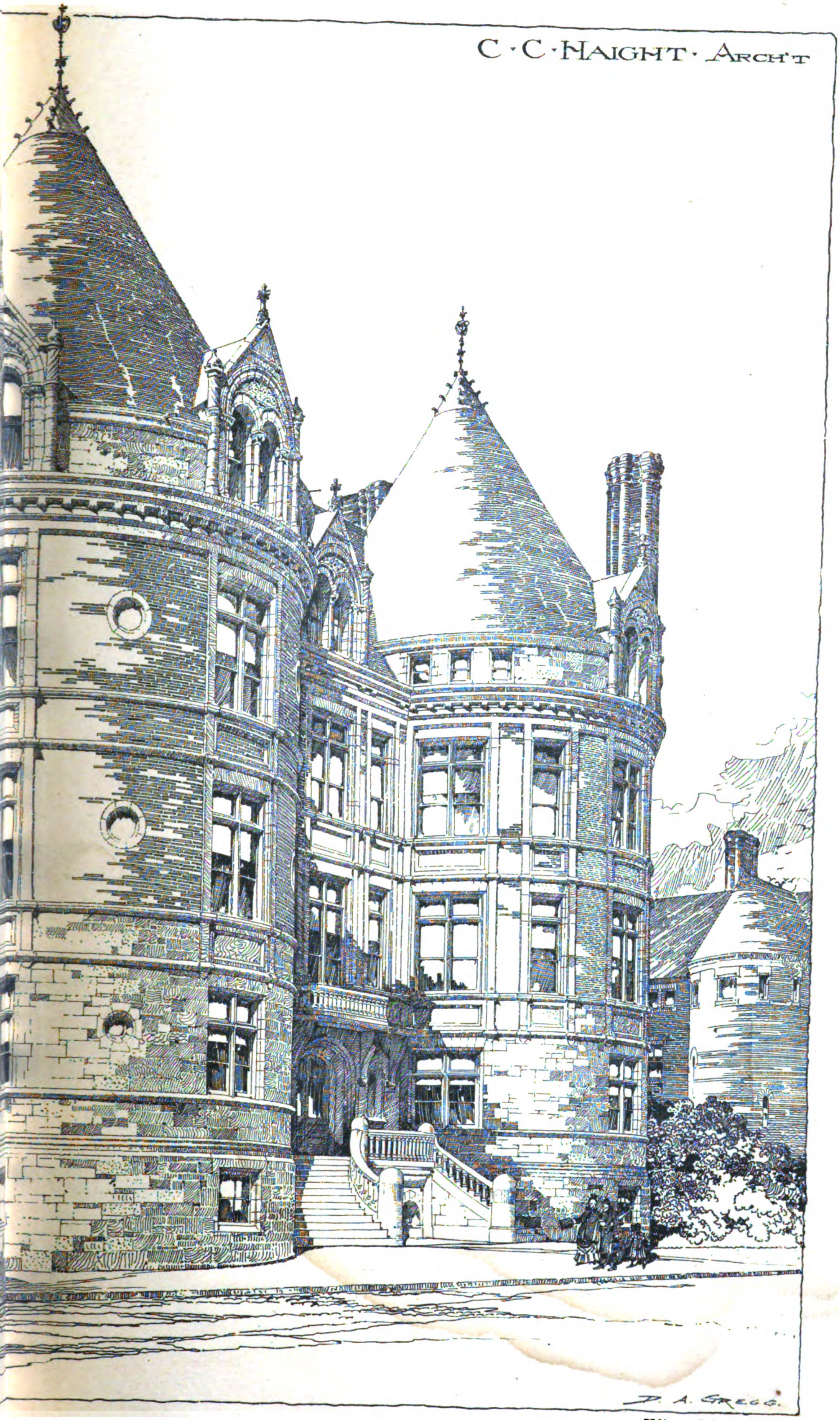

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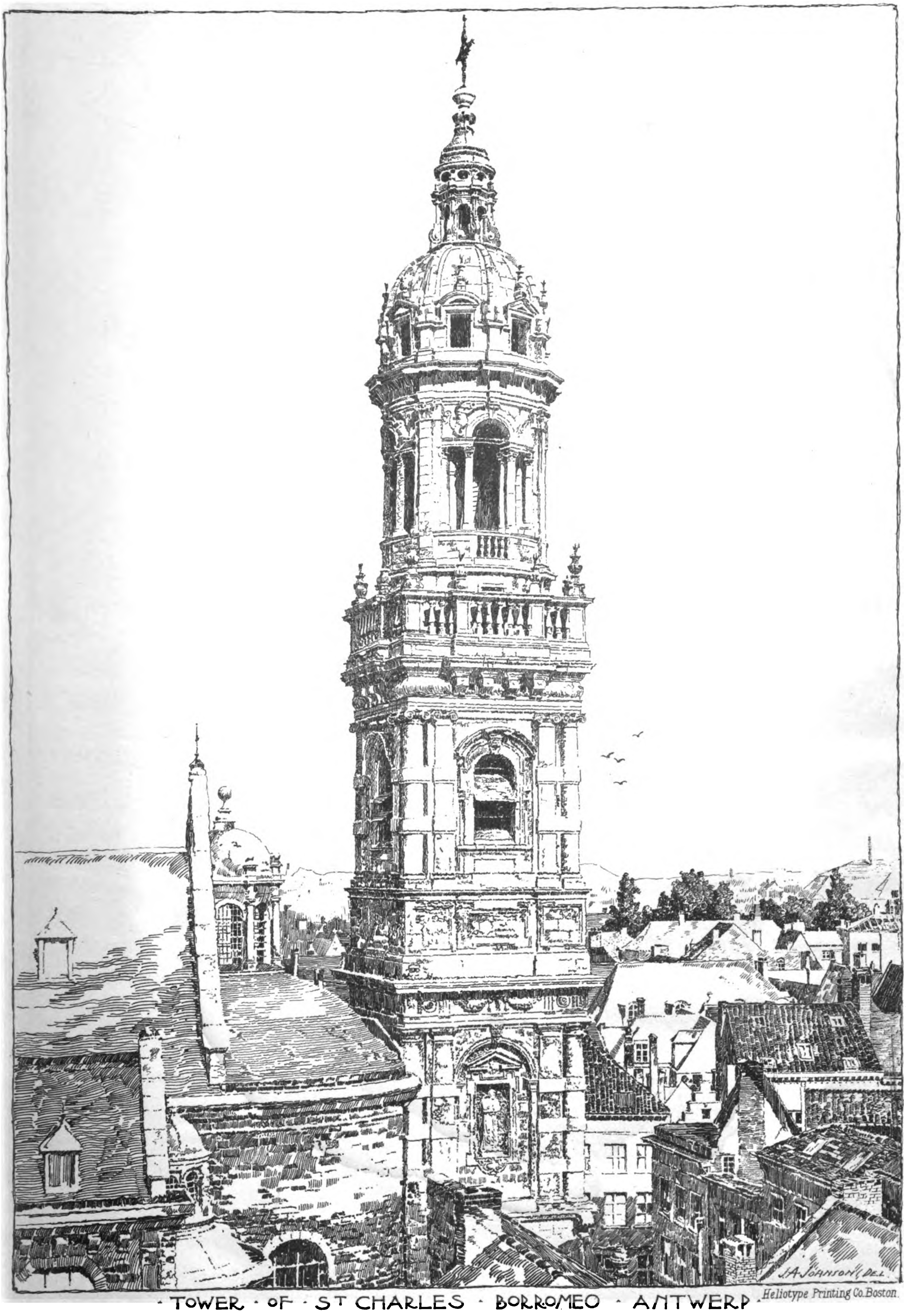

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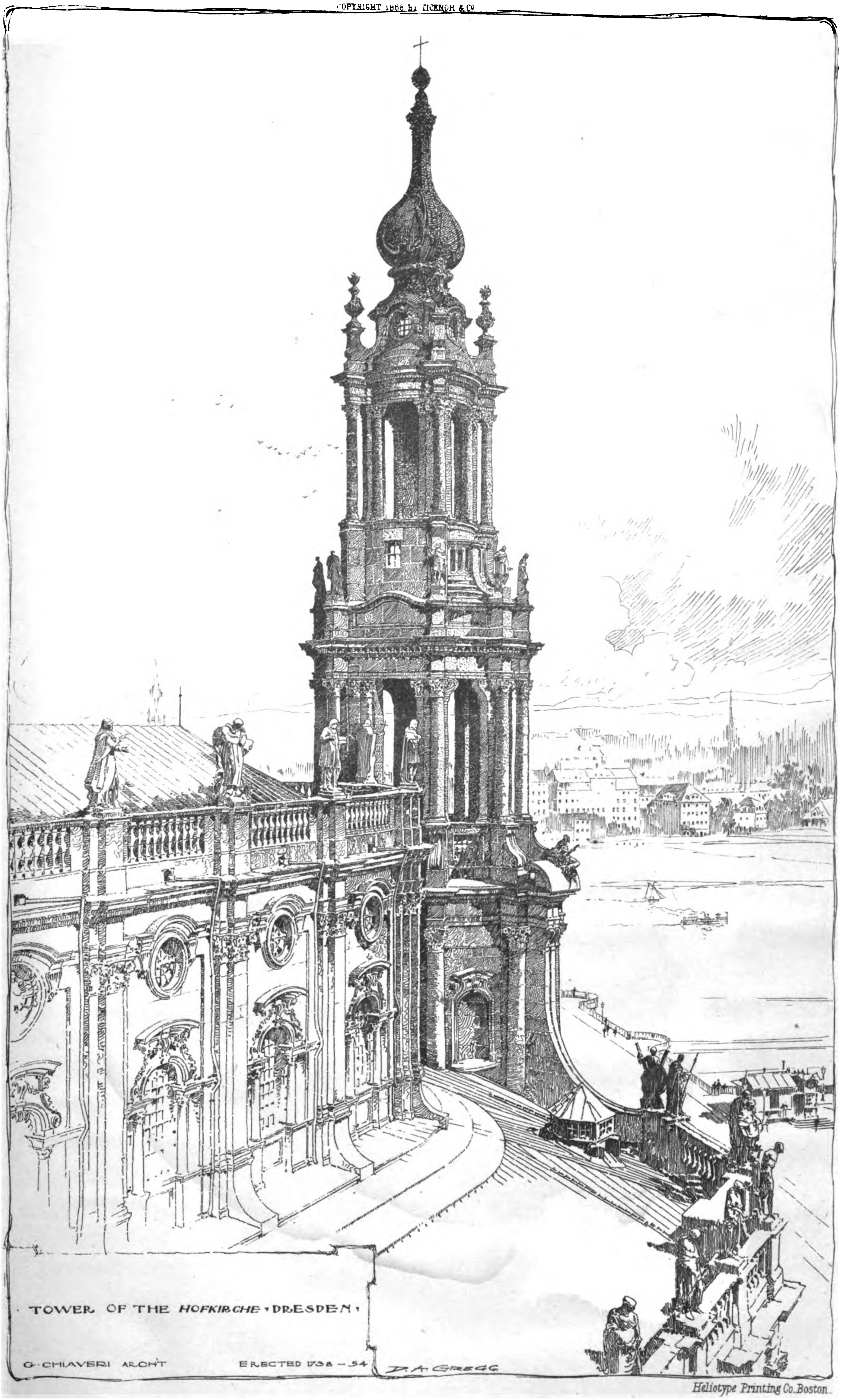

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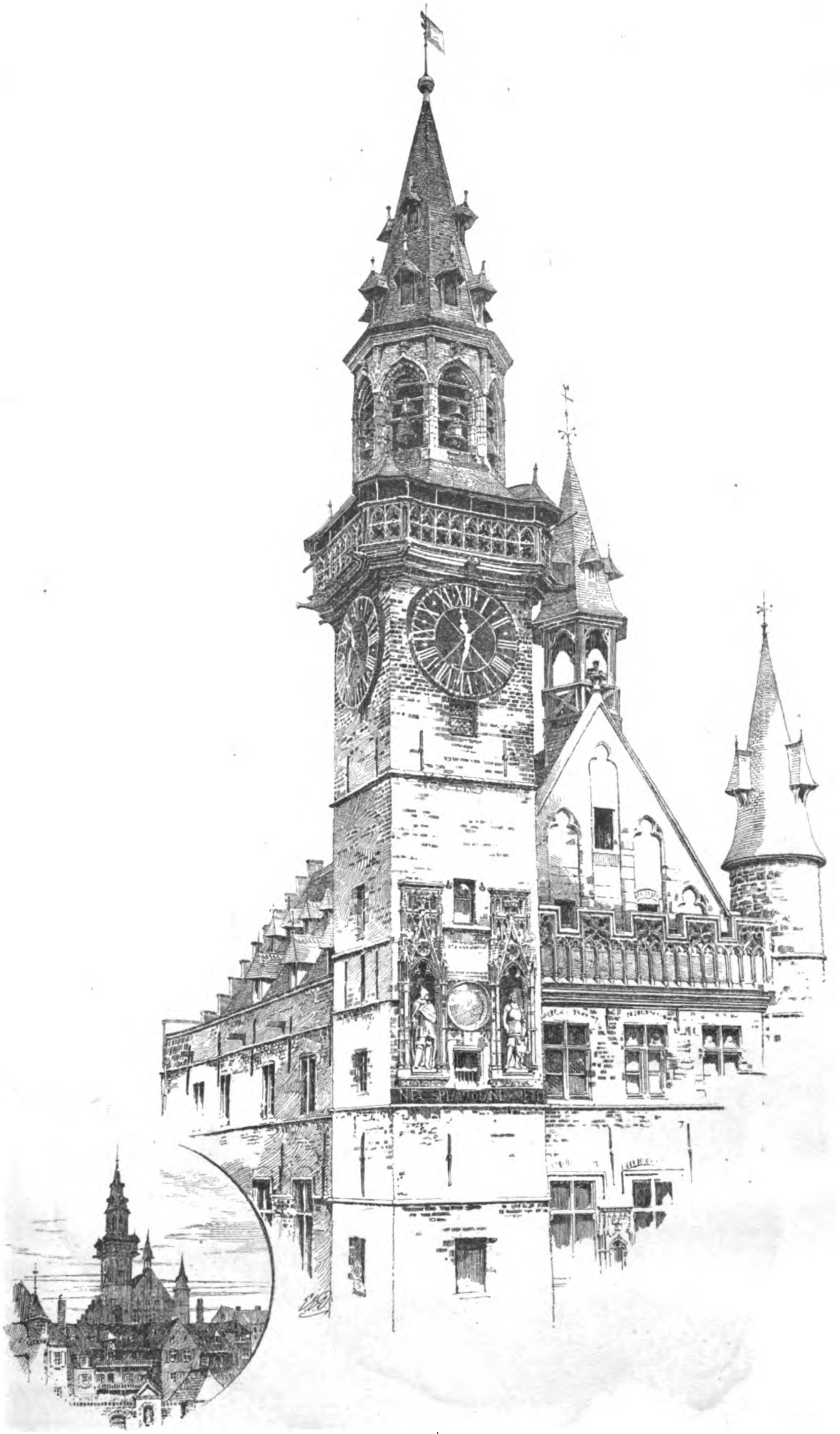

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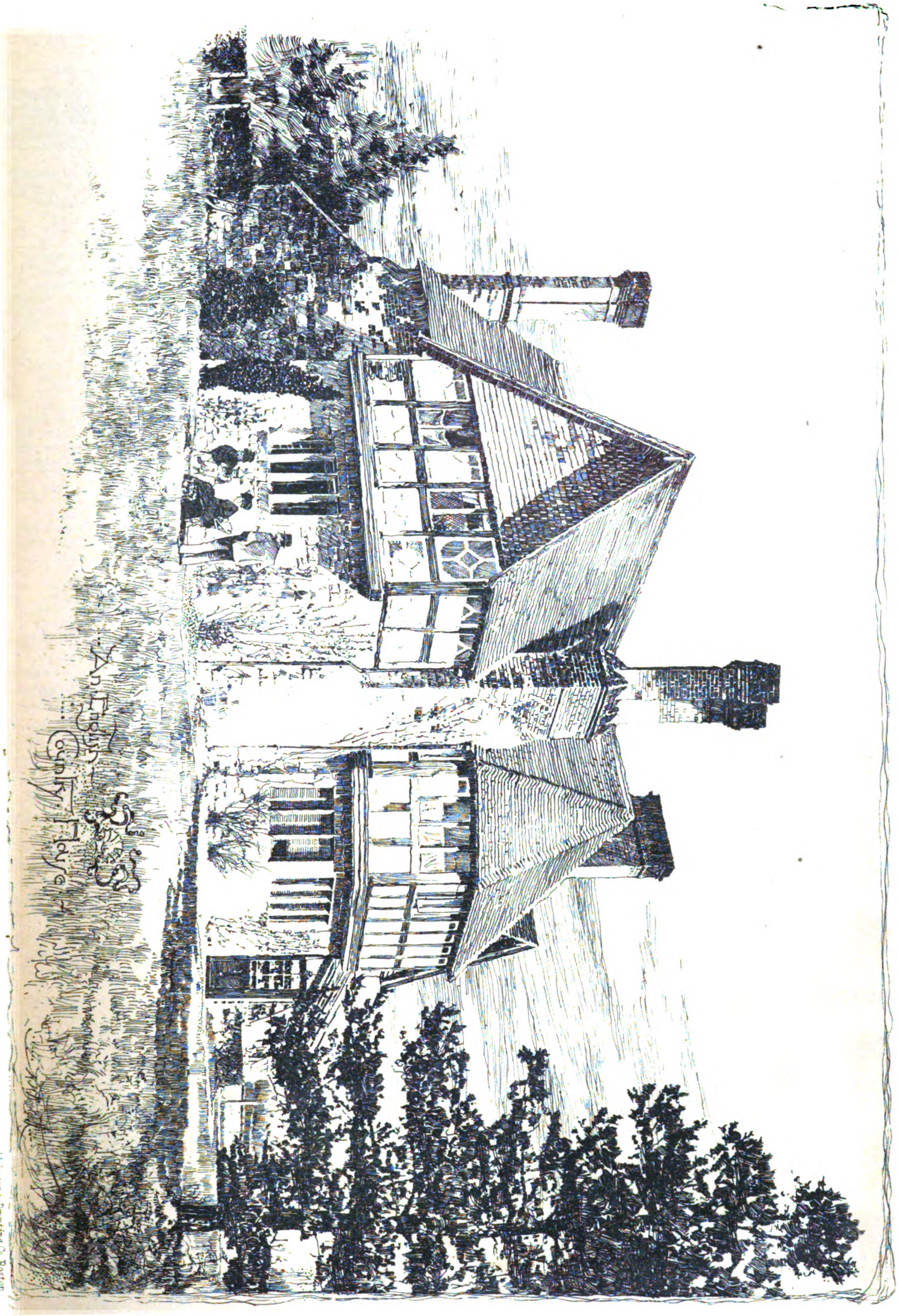

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THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIV. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 679.

DECEMBER 29, 1888.

Entered at the Post-Office at Boston as second-class matter.

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A CERTAIN shrewd worldly wisdom is shown by those publishers of periodicals who have fixed the beginning of their subscription years in any other month out of the twelve than in January, when the temptation to practise unwise economies is strongest. With us, however, other considerations overbalanced this advantage and our subscribers are once more invited to renew their subscriptions at a time when many will find the request unwelcome and unseasonable. We have done what we might to gild the pill, by arranging certain "club-rates" which will be found set out on one of the advertising pages.

WE draw attention to a document in another column, which has a bearing on the competition for the enlargement of the Massachusetts State-House. The opportunity is so good for making an impression, not only on the Commission in charge of this particular competition, but on the public generally, that we propose to publish this declaration of principles weekly, adding to the list of signers the names of those architects and draughtsmen who may from time to time authorize us to append their signatures. It is a first-rate chance for the profession to "range" itself openly for or against improper conditions of competition, and we ask architects in every section of the country to send us their authorization to add their names to the roll of protestants; and that there may be no verbal inconsistencies in the way, we have interpolated two words, bracketed, in the preamble.

WE commend to the attention of the Legislative Committee on the Extension of the Massachusetts State-House the terms of the competition, which was recently announced, for the new Italian Parliament-House. The building is not to cover an extremely large area, but a year is given for the preparation of the designs, and the execution of the work is promised to the successful competitor, unless the Government should fail to agree with him as to the terms of his employment and remuneration. In that case he is to receive twenty thousand dollars for his sketches, and the Government is to retain them, and carry them out as it may see fit. The authors of the five designs placed successively next to the first are to receive money prizes, five thousand dollars being set apart to be divided among them as the Committee may think best. Unfortunately the competition is limited to Italian architects, or we should advise our brethren in Massachusetts to try their fortune in Rome, where what they can do appears to be so much better appreciated than among their own people.

A GOOD deal is said in the German technical papers about a patent "frost-proof Portland cement," made by Heinrich Hausleitner, 13, Schulgasse, Meidling, Vienna. We do not give this gentleman's address to advertise his material, but because it seems to us that a frost-proof cement would be particularly useful in this country, where mortar is exposed to freezing six months in every year, and if Mr. Hausleitner's cement cannot be imported, it would be well worth while for some one to try to impart anti-freezing properties to our Rosendale cements. This could undoubtedly be done, as the Vienna manufacturer produces frost-proof plaster-of-Paris, as well as cement. The cost of the prepared Portland cement in Vienna is a little over one cent a pound.

ONE of the most extraordinary groups of buildings in existence is certainly that belonging to the Institut Pasteur, which has just been inaugurated in Paris. It is not that the architecture is particularly strange, the buildings being rather plain brick and stone structures, designed with true French refinement, but the purposes of the various portions, as marked on the plans, which we find, with an interesting account, in *Le Génie Civil*, are startling enough even for Parisian taste. The Institute itself, as every one knows, is the fruit of a public subscription which was opened in 1886, after M. Pasteur had already inoculated three hundred and fifty patients, and in two years and a half reached the amount of five hundred thousand dollars. The quarters occupied by M. Pasteur in 1886 were altogether inadequate to accommodate the multitude of patients who flocked to him, and, as soon as it was found that the subscription would be successful, the Commission appointed by the Academy of Sciences secured a large piece of ground in the Vaugirard quarter, on which has now been constructed a group of ten buildings, surrounded by a pleasant garden. The main front, on the Rue Dutot, is ornamented by a group in bronze by the sculptor, Truffot, representing one of the great *savant's* patients fighting with a mad dog. Behind this agreeable work of art, which is the gift of the city of Paris, rises the façade of the main building, containing the apartment of M. Pasteur, with kitchen, laboratory, rooms for students and assistants, library, and so on. Beyond this, and connected with it by a wide corridor, is the building where patients are treated. The ground-floor of this is divided, one side bearing the suggestive title of the hydrophobia wing, while the other is the general wing. In the hydrophobia wing we find a reception-room for patients, offices for registration and for archives, an inoculation-room, a bandaging-room, a room for patients requiring temporary rest, an operating-room, a lavatory and a "marrow-room," this being, of course, the storage-room for the inoculating virus, which is obtained from the spinal marrow of rabbits. Over these rooms are various subordinate services, with a laboratory of "applied microby," and the rest of the building is devoted to other laboratories, chemical and microbial, collections, and so on. The grounds about these two buildings, the entrance to which is guarded by a porter's lodge, are laid out in promenades for patients, and in the rear is a sort of zoölogical garden, containing a large stone building for mad dogs; a group of kennels for healthy dogs intended as food for science; an aviary, the object of which we are unable to guess; an aquarium; a building for animals of various kinds under treatment; and stables, sheds, keeper's lodging, and store-houses. The whole plan is laid out with much care for the active service which it is called upon to perform. Few persons in this country realize how great a work M. Pasteur has done since his first inoculation for hydrophobia in 1885. We have heard arguments, sneers, and assertions of all sorts about him, and we imagine that a good many people have concluded that his discovery has proved a failure, and that after killing a large number of patients his treatment has been abandoned. Instead of this, the records of the cases show that in two years and a half, up to July 1, 1888, five thousand, three hundred and eighty-four patients had been inoculated for hydrophobia in the Paris laboratory alone. In many cases the treatment came too late, and the sufferers were seized with hydrophobia before the inoculation could take effect; but, including all these cases, the mortality in 1886 was only thirteen out of every thousand persons treated, while in 1887 it was eleven in a thousand, and in 1888, to October 1, only eight in a thousand. As the period of incubation for the virus, before the inoculation takes effect,

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is fifteen days, it is fair to eliminate from the mortality those who died of hydrophobia within the fifteen days before the treatment could take effect, and with these cases excluded the mortality for each year would be reduced about one-third. Certainly, if a person who has been bitten by a mad dog, by going to M. Pasteur for inoculation, can have the chances of his dying of hydrophobia reduced to one in a hundred and fifty, the Institut Pasteur will never lack patients so long as dogs are allowed to run at large; and the annals of the affiliated establishments show that similar results follow the treatment in other hands. It will surprise many readers to learn that there are now more than twenty "hydrophobia institutes," on the Pasteur system, in various parts of the world. Of these, seven are in Russia, a country where hydrophobia is very common; one at Bucharest, in Roumania; five in Italy, at Naples, Palermo, Milan, Turin and Bologna; one at Vienna, one at Barcelona, one at Rio de Janeiro, one at Buenos Ayres, and one at Havana; and two more, one at Chicago and the other in Malta, are in process of organization. At some of these affiliated stations many patients are treated. At the one in Odessa eleven hundred and thirty-five persons have received inoculation; at Warsaw six hundred and sixty-five had been treated at last accounts, and at Moscow six hundred and thirty-three. Many of the cases in Russia come from the bite of mad wolves, and are terribly severe, but the treatment, under which the mortality was at first from three to eight per cent, has been modified by experience, so that now the deaths average considerably less than ten in one thousand. In Italy, seven or eight hundred persons have been inoculated with remarkable success, but the statistics cannot be compared with those of other countries, owing to a freak of the municipal government of Naples, which, hearing some of the familiar arguments of Pasteur's opponents, summarily cut off supplies to the establishment in that city, so that it had to be closed after curing two hundred and thirty patients. In seven months afterwards nine persons died of hydrophobia in the city, and the establishment was called into existence once more.

MR. J. A. GOTCH, of the English Architectural Association, who is one of the best of authorities on Elizabethan domestic architecture, read a paper last month before the Association on "Elizabeth and Victoria," which contains an unusual amount of common-sense in dealing with his subject. As we know, archæology, particularly architectural archæology, is a sore point with most Englishmen. As Mr. Gotch himself said, when he began, twenty years ago, to interest himself in the domestic building of the sixteenth century, an architect who looked at anything but Gothic work was regarded as being disordered in mind, if not hopelessly perverted in morals, and although Mr. Ruskin, with his fervid nonsense about the "foul flood of the Renaissance," and other things that he happened to like or dislike, has long been forgotten as a critic of architecture, there are plenty of lesser preachers, who have now adopted this or that Dutch, Italian or other style, and belabor people who do not know or do not care about their particular hobby with a zeal which leads the average student of architecture to imagine that his spiritual condition must somehow depend upon the mouldings which he permits himself to notice. In amateurs this state of mind is a matter of no particular importance, but, in young architects, the notion that all beauty is to be looked for in a particular style is the precursor of paralysis of the faculty of design, and such men as Mr. Gotch, who can trace the origin of particular forms and criticise them dispassionately, do a great deal of good in the profession. Every one remembers that during the reign of Elizabeth England was seized with a building fever. An immense amount of money had accumulated in the hands of people of rank, partly, perhaps, from the income of the church estates confiscated by Henry the Eighth and distributed to his favorites, partly from the plunder brought into the country by the privateers which preyed on the commerce between Spain and her new American colonies, and partly as the natural result of a long period of peace and prosperity under a strong government. While gentlemen and noblemen were liable at any time to raids from their neighbors, and were obliged to keep permanent garrisons in their castles, there had been little opportunity for making these anything better than extensive, but gloomy fortresses; but the wisdom and energy of Elizabeth and her ministers, joined with the exultation which followed the defeat of Spain, then the most dreaded power in Europe, combined to develop a sense of security and patriotism, which showed itself, as such a feeling has in repeated instances in other countries, in a passion for erecting buildings better suited than the old ones to the new thoughts and hopes that had arisen in their owners.

THE number and richness of the mansions erected within a few years is almost incredible. Many noblemen and gentlemen ruined themselves by their building operations, and it was not uncommon for a man of fortune to spend half of what he had on a house. At that time, we must remember, living was very simple, and secure investments were almost unknown, so that it was natural for a man who found himself with a large amount of cash in hand to use it in building, without feeling that he thereby imperilled his own comfort or the income of his children, and the rivalry between the richer proprietors soon became keen. As might be expected, in planning the new palaces, nearly everything was sacrificed to show. People who lived contentedly with their dogs in rooms carpeted with rushes, which were changed once a week, could hardly be expected to be very squeamish in regard to niceties of arrangement, and it is common to find the bed-rooms opening from each other, after the fashion of a New York tenement-house, without any corridor for reaching them separately, while in some very magnificent mansions the suites of rooms allotted to visitors could only be reached from the reception-rooms by crossing the court, which, it is needless to say, had no provision for sheltering from the rain or snow the festal clothes of the persons who walked through it. So inconveniently planned, according to our notions, are the Elizabethan mansions in this respect, that they can hardly be used at all by a modern family. One or two of them have been remodelled by the rather heroic treatment of building a corridor around the courtyard, like a cloister, so as to reach the farther bed-rooms without going through all the others, but this darkens half the windows, besides spoiling the court. In other cases a portion of the house has been rebuilt, at a great expense, according to our ideas, but most of the Elizabethan palaces, splendid as they once were, have been allowed to go to ruin, simply from the impossibility of utilizing them for a modern family without very costly alterations. Even the reception-rooms, magnificent as they are, accord ill with the habits of the present representatives of the families which built them. Three hundred years ago aristocratic hospitality was less exclusive than now, and the lord of the manor, who feasted with his most honored friends at the high table on the dais at the end of the great hall, and looked with complacency upon the crowd of less distinguished guests who struggled for their dinners at the tables which occupied the rest of the immense room, could count on having the "long gallery" which opened out of it well filled with dancers and promenaders in the evening, after the banquet was over, while his descendants are chilled by the contrast between the huge, dark rooms and the small company which now gathers in them. In a few instances, as at Hatfield House, Lord Salisbury's favorite residence, the ancient mansions will probably be kept in habitable condition for many years longer; but the great majority, like Haddon Hall, the most beautiful of all, will inevitably be abandoned, sooner or later, by their owners, from the impossibility of being comfortable in them, and they will fall, one after another, into decay. Whether this will be a great loss to architecture is not altogether certain. The plans have been recorded in many books, so that we shall not lose the recollection of their stately and picturesque arrangement, but the details of the designs are rarely of a very high order of merit. The rich ceilings, made of plaster modelled by hand, are often the best portion, and it is much to be hoped that some one will secure and publish measured drawings of all those now existing, before they disappear; but the woodwork is no better than that done now, while the carving, both on wood and stone, is of little value, either in design or execution, and would hardly be noticeable except for the lavishness with which it is used. According to Mr. Gotch, moreover, the houses of that period contained glaring faults. Symmetry being, in the minds of the architects of the time, necessary to correct taste, windows and bays were distributed almost without regard to the interior planning, and a bay illuminating the great gallery might be balanced by one of equal size in the buttery. Where real windows could not be used, false ones were put in without compunction to preserve the symmetry of the composition, and Cobham Hall, one of the best examples, is, as he says, "riddled" with sham-windows, put in with real mullions and transoms and glazed, but closed behind the glass with a wall.

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AUTUMN JOURNEYS IN MEXICO.[1] — IV.

PUEBLA.

Pyramids of San Juan Teotehuacan.

PUEBLA is reached by a branch of the Mexican Railway running from Apizaco, about eighty-five miles from the city of Mexico, and one hundred and seventy-five miles from Vera Cruz. The journey is made from the capital about the middle of the forenoon; if from Vera Cruz, late in the afternoon, reaching Puebla about nightfall — a delightful time of the day for travel in Mexico. An English compartment-car is provided for the comfort of the traveller, and the road runs down a broad valley, about thirty-five miles, with three snow-capped mountains, Popocatepetl, Iztaccihuatl and Orizaba, constantly in view.

Puebla is a city of about seventy-five thousand inhabitants which no tourist in Mexico should fail to visit. In the character of its buildings, and in the number and magnificence of its churches, it is the rival of the capital. Unlike nearly all other cities of Mexico, it is of Spanish origin, having been founded in 1530 by about forty families of Spanish colonists, under the leadership of the Franciscan friar, Torribio Benevento, better known as *Motolinio*, or the poor and humble. It was called *La Puebla de los Angeles*, or the town of the angels, until after the French invasion of Mexico, when it was renamed *Puebla de Zaragoza*, in honor of General Zaragoza, who commanded a gallant defence of the city against the French army in 1862. This battle of the 5th of May (*Cinco de Mayo*) has given to the republic one of its principal national *fiestas*. It was by no means a decisive battle of the war which it began. The French troops were on their way to the capital, and, after this repulse, retired to Orizaba, then advanced again, captured Puebla and occupied the capital, causing the Republican Government to retire to the northern part of the country. The French held the capital while the monarchical party organized and established an Empire, electing the Archduke Maximilian of Austria, Emperor. Puebla remained in the hands of the Imperialists until towards the overthrow of the Empire in 1867, when it was taken by the Republican General Porfirio Diaz, now President of Mexico. For a long time I sought an explanation of the enthusiasm which greeted the annual return of the *Cinco de Mayo*. Once I was told that it was the only victory ever won by Mexicans over a *foreign* foe. Every other victory won by Mexicans on Mexican soil was over their own countrymen. Perhaps that is as good an explanation as any. But there may be another reason why so much is made of *Cinco de Mayo*. Many of those at present in power in Mexico (the President among them) were in the battle of Puebla on the 5th of May, 1862. It was for their sakes that the day became famous.

The city is attractive in its situation and in its general characteristics. Being the see-city of a Roman Catholic diocese, it possesses

Maltrata y las Cumbres, Mexico.

a cathedral, which happens to be much handsomer than that at the capital. It was begun prior to the year 1636, and was consecrated in 1649. It is possible that a building of a hundred years earlier date is comprised within the *sagraria* or parish-church which adjoins the cathedral. The cathedral contains some handsome paintings by Mexican artists, and the interior decorations are worth close study. There are other churches equally interesting, each possessing something worth seeing either in the way of architectural features, paintings, wood-carvings, statuary, or relics. One of these, the Church of San Francisco, built in 1667, possesses an arch for the support of the choir-gallery, which is so flat that no one believed it would remain in place. The architect who planned it had less faith

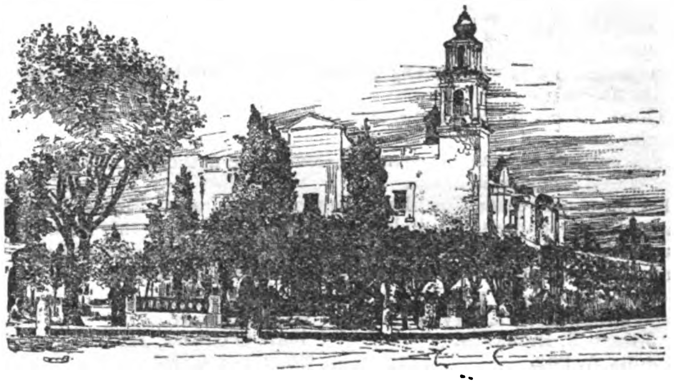
in it than any one else, and fled to escape criticism and, perhaps, less bearable punishment. Yet the arch remains, at the end of two hundred years, as firm as ever.

A characteristic of the architecture of Puebla is the extensive employment of tiles — pictorial tiles frequently — upon street fronts. The entire front of a building will sometimes be a mosaic of glazed tiles. The city is well kept. Besides a main *plaza* (characteristic of every town in Mexico, however small), it has several smaller *plazas*, and its two fashionable drives or *paseos*, as they are called, are very attractive. Near the town are quaries of *tecali*, Mexican onyx (or Puebla marble, as it is there called). This material is worked up into ornaments of every description, and may be obtained at very reasonable prices. It is extensively used in the interior decoration of churches in Puebla and elsewhere.

To most tourists a visit to Puebla would be incomplete without including a trip to the famous pyramid of Cholula. It is only seven miles distant, and is reached by horse-car. Readers of Prescott will not fail to remember the conspiracy which Cortés discovered in Cholula, and revenged by the massacre of three thousand Cholultecas. Of the pyramid then existing there remains what appears to be an irregular hill, crowned by a church. It has been referred by archæologists to a period antecedent to the conquest, and to the race of Toltecs or Olmecs. At the time of the conquest a temple was found upon its summit, dedicated to Quetzalcoatl, the "Fair God" of General Lew Wallace's charming romance. This was thrown down by the Spaniards, and a Christian church was built in its place, but not the one now standing there.

If the tourist be only interested in what appears to the eye of the ordinary observer, he will ascend the mound and enjoy the view from the summit. At the foot of the mound appears the city of Cholula, regularly laid out, containing a market-place, to which still clings the old Aztec name of *Tiangues*. I attempted to count the churches in sight from the summit of the pyramid, but the view is so extended and the churches are so numerous that I gave it up. Cholula itself contains over twenty. Puebla, which is in full view, contains more than thirty, and scattered over the broad valley are many more. There are other mounds in the immediate neighborhood to suggest the possibility of other pyramids, but they do not appear to receive any recognition from the Mexican *savants*.

The boys of Cholula are not lacking in enterprise, and beset the tourist with fragments of idols and other clay figures, which they claim to have found in excavating around the base of the pyramid. Their genuineness may be questioned. But, in climbing around the



Church of Guadalupe, Jalapa, Mexico.

pyramid, I found what might be called an Indian arrow-head, but what was more probably the point a of *maquahuitl* or battle-axe of the primitive races. It was of obsidian or volcanic glass, perfect in shape, and well preserved. The genuineness of such a relic, or its value, could not be questioned. May other visitors at Cholula be as fortunate as I was.

ARTHUR HOWARD NOLL.

[1] Continued from No. 678, page 288.

ILLUSTRATIONS.

HOUSE OF JOSEPH H. CHOATE, ESQ., STOCKBRIDGE, MASS. MCKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y.

[Gelatine Print issued only with Gelatine and Imperial editions.]

ST. ANDREW'S CHURCH AND PARISH-HOUSE, BOSTON, MASS. MESSRS. ALLEN & KENWAY, ARCHITECTS, BOSTON, MASS.

THESE buildings represent in some respects a new departure in church architecture. It has long been felt that to combat the moral difficulties of modern city life the church must provide something more than Sunday services, and hence most of our churches have many benevolent and educational agencies connected with them. Trinity parish in its off-shoot, St. Andrew's, seeks to furnish room in one group of buildings for these agencies. The church, the porch of which is the principal feature of our sketch, is withdrawn some seventy feet from the street to avoid the noise of a busy thoroughfare. At right angles to the church and extending forward to the street is what is called the parish-house. In the three stories of this building, space is provided for a dispensary, a girls' industrial club, rooms for the Sunday-school, and sewing-schools, a boy's reading-room and gymnasium, an office for the clergyman, and a large hall for lectures and concerts.

CENTRAL PARK TERRACE, MINNEAPOLIS, MINN. MR. W. D. KIMBALL, ARCHITECT, MINNEAPOLIS, MINN.

THIS block of eighteen houses was built about two years ago. Outside material, two colors of Dresbach stone; inside finish, hard-wood; cost (including the boiler-house with laundry and electric-light plant and tunnel connecting same with building), $150,000.

CHURCH OF THE ASCENSION, SIERRA MADRE, CAL. MR. E. A. COXHEAD, ARCHITECT, LOS ANGELES, CAL.

THE cost of this little church which seats about 170 persons was $4,500. It is built of roughly broken granite boulders.

THE BILLINGS MEMORIAL LIBRARY, BURLINGTON, VT. MR. H. H. RICHARDSON, ARCHITECT.

THIS building has been lengthened during the past summer and now has a somewhat different air from that of the small sketch we published two or three years ago.

HOUSE OF CHARLES A. PILLSBURY, ESQ., MINNEAPOLIS. MINN. MR. L. S. BUFFINGTON, ARCHITECT, MINNEAPOLIS, MINN.

PRESBYTERIAN CHURCH AND CHAPEL, LOS ANGELES, CAL. MR. S. I. HAAS, ARCHITECT, LOS ANGELES, CAL.

PROTEST AGAINST THE COMPETITION FOR THE MASSACHUSETTS STATE-HOUSE.

BOSTON, MASS., December 18, 1888.

THE Commonwealth of Massachusetts has, by its Commissioners, advertised for designs for the State-House extension, said designs to be furnished in open competition. The conditions of the competition, as announced, have evidently been framed without due regard to the best custom in the conduct of such matters, the sole end and aim of which should be to secure to the State the best service by making sure that "the best men shall take part; that they shall be encouraged to do their best; that the best they offer shall be selected; and that the author of the successful design shall be employed as architect, provided the building is built and he is competent."

The conditions announced are faulty —

First. In that they are not drawn up in accordance with the best custom, and no assurance is given that an expert adviser will be employed to aid the Commission in their choice.

Second. That no assurance is given that the successful competitor will be employed, but, on the contrary, it is distinctly stated that all premiated competitors are to relinquish all ownership in their plans to the State, without any further claim to compensation or employment.

Third. Even if the first prize in the competition were as it should be, the execution of the building, the actual prizes offered would still be entirely insufficient compensation to the authors of the drawings placed second and third.

For the above reasons, we, the undersigned architects, citizens of the State of Massachusetts [and elsewhere], protest against this form of competition, which, in our opinion, is not for the best interests of the State or of our profession, and we, therefore, decline to enter it:

CABOT, EVERETT & MEAD.
WHEELWRIGHT & HAVEN.
JOSEPH R. RICHARDS.
JOHN A. FOX.
GEO. M. YOUNG.
E. A. P. NEWCOMB.
LONGFELLOW, ALDEN & HARLOW.
EDWIN J. LEWIS.
ANDREWS & JAQUES.
H. LANGFORD WARREN.
WALKER & BEST.
WM. ROTCH WARE.
HARTWELL & RICHARDSON.
CUMMINGS & SEARS.
T. M. CLARK.
ALLEN & KENWAY.
RAND & TAYLOR.
THOS. O'GRADY, JR.
STURGIS & CABOT.
SHEPLEY, RUTAN & COOLIDGE.
ROTCH & TILDEN.
SNELL & GREGERSON.
SHAW & HUNNEWELL.
WM. G. PRESTON.
L. WEISSBEIN.
FRANZ E. ZERRAHN.
CARL FEHMER.
ARTHUR LITTLE.
PEABODY & STEARNS.
WINSLOW & WETHERELL.

MEDIÆVAL HOUSES.[1] — IX.

COUNTRY HOUSES.

Fig. 40.

AS was said at the beginning of this article, we must not confound country houses with manors. The manor is the dwelling of a gentleman, a chevalier, who does not possess the right of high and low jurisdiction, but who is a landed proprietor, and who owes only to the lord of the manor personal military service. The country house, the "*masure*," is the dwelling of the tenant, the planter, the farmer, the peasant. Country people remodel their houses much less often than the people of the towns, because they are too poor, and because their wants vary little. The citizen of our day has preserved none of the habits of his ancestors, while the peasantry in the midst of the nineteenth century lead nearly the same life as those of the fourteenth.

The lower we go in the social scale, the less difference we find between the country houses of the Middle Ages and those of to-day. In travelling through those French provinces which have been particularly withdrawn from contact with the people of large cities, such as certain parts of Languedoc, Corréze, Auvergne, Berry, Saintonge, Bretagne, Haute-Marne, Morvan, Jura and the Vosges, we still find secular dwellings which have been only slightly altered, and furnish us, probably by transmission, examples of dwellings of of the Gallo-Romanic rustics. In these dwellings we recognize the employment of certain methods of construction which preserve all the characters of a native art; and, though the material be coarse and the workmanship rough, the application of the principle is true, and, above all, stamped with that subtile charm which attaches to all primitive arts for those who know how to see it. There still exist in the wood of Morvan several dwellings of the peasantry in which an ancient countryman, returning after sixteen centuries, would find no change; and we have seen, ourselves, on the borders of the Loire, the Seine, and in the Vosges, peasants living in grottos hollowed out by the hand of man, which are preserved as they were when first seen by the Roman armies.

The variety of these country dwellings is one of the proofs of the preservation of the ancient traditions. While all our city houses of to-day are very much alike, the reverse is true in the country: the cottage of Picardy has no resemblance to that of Brittany; these differ essentially from the cabin of the Morvandian, which, in turn, is not at all like those of the Franc-Comtois, of the Auvergnat, or of the Bas-Languedocien. I have chanced to stop in certain French villages where each house is built on a pattern of its own, quite primitive in character, and remote from the methods of our modern civilization, in which everything tends to obliteration of individuality. It would be difficult to classify the houses of the peasantry into epochs, as has been done in the case of city dwellings; and, in fact, the transmission of several marked types through the whole mediæval period would render the attempt quite useless. We are almost inclined to believe that in some provinces the same kind of rural house has been building since the invasion of the barbarians, and it is difficult to distinguish a dwelling of the tenth from one of the fourteenth century.

We will content ourselves, then, with discussing some of the most characteristic types, without assigning them to any precise period. These domiciles, built generally with the aid of the most simple means, have withstood the modifying effects of time, and preserved their primitive character only by the constant reproduction of the same processes, the employment of the same materials, and a remarkable conservation of old customs. The oldest houses, or at least, those which seem to have undergone the least alteration, are found in the middle country or in the East. In Morvan, the old houses of the peasantry are mere masses of heaped-up stones. The walls are built of great blocks of granite, and are broken only by small openings. There is a very low ground-floor, serving as cellar,

Fig. 41.

[1] Translated from the French of Viollet-le-Duc, by Mr. A. B. Bibb. Continued from page 281, No. 677.

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storehouse, hen-house, or pig-sty; a door raised one or two metres above the ground, with stairs and landing built into the wall; and a ceiling of heavy beams, a garret above, protected by heavy timber-work, covered with layers of stone called "*laves*" (Fig. 40).

Each house contains only one room, with its chimney. If one wishes two rooms he builds two houses, joined by the gables. In this dwelling there is no decoration, nothing which shows a taste for even the rudest art. The wood is hardly squared; the floor is covered with earth beaten down over a layer of stone, sand, or clay.

In Nivernais and Upper Burgundy, on the contrary, we find traces of art in the peasants' houses. The lintels of the doors are laid with care, the posts are well finished, the interiors are plastered, and sometimes covered to their full height with a wainscot. The timbers are carefully squared, and even chamfered, tiles from very ancient times having replaced the rude covering of stone. The outside staircase is well placed, the landing has beautiful railings of stone; the timbers of the ceiling project over the front and are framed into the rafters, forming a pent-house (Fig. 41). These dwellings of the Burgundian country-side are often ornamented with care, and affect certain architectural forms.

The well-preserved peasants' houses in the village of Rougemont, between Montbar and Aisy, furnish proof of this. These houses, which date mostly from the beginning of the thirteenth century, having their gables to the road, are built with remarkable care (Fig. 42), and almost all have a story above the ground-floor; but it must be added that this village was the dependency of a rich abbey.

Fig. 42.

In the neighborhood of religious establishments, the houses of the country people are found better constructed up to the fourteenth century, and commonly built of stone. Suenon says that the ground intended for the dwellings of the peasantry around religious agricultural establishments was divided into equal parts. "We think," says M. L. Delisle, "that this example has been often followed in our province (Normandy), where for a long time the word 'boels' has had the sense of yard or hovel. The 'boels' were ordinarily long, rather than wide, whence the widely-spread term of 'longs boels.' At one of the ends of the 'boel' each one built his cottage. All the doors opened on the same side on the road, which thus became the street of the village." This arrangement is observable at Rougemont, as in several other agricultural centres belonging to abbeys during the twelfth and thirteenth centuries. In the North, in Normandy and Picardy, the country dwellings, the "masur," "mansura, masura, masagiurn, mesagium, masnagium," was an enclosed field, with the house usually built of wood. On the borders of the lower Seine, the Orne, the Dives, on the Channel coast from Eu to Cherbourg, the Normans have left still apparent traces of their genius. The houses of the peasants have timber-work, panels filled in with earth mixed with straw, and are covered with thatch or shingled.

In late years the ancient houses of those countries have begun to disappear, and to be replaced by the small brick house, covered with slate. There were still a great number to be seen up to 1830, which recalled by their structure the woodwork of Norway, Denmark, and that shown on the Bayeux tapestry. The Normans, like all the Scandinavian people, built only in wood, and were good carpenters from the time they established themselves on the shores of France. Navigators as they were, they preserved in their houses some traces of naval architecture. The reputed Saxon manuscripts of England, preserved in great numbers in the British Museum, show in their vignettes some specimens of houses, which also resemble naval construction in some respects.

Fig. 43.

In Norway and Iceland there still exist several wooden buildings of a comparatively recent date (sixteenth century) which exactly reproduce the forms and processes of a much more ancient art. In these dwellings, as in those on the Bayeux tapestry, we remark, for example, the richly decorated finials on the ends of the roof-ridge, bound above the roof by pieces of wood cut in the shape of a crest. There were until recent times, in the country of the Eure, some traces of this tradition remaining (Fig. 43). These Norman houses of the eleventh and twelfth centuries contained only one room, quite high, lighted on all sides and sheathed with woodwork, coarsely panelled. The fireplace was near the middle of the room, and the smoke escaped by a wooden flue in thick tiles through the roof.

In the central provinces, as Auvergne, Velay, and the northern part of ancient Aquitaine, the Celtic traditions were preserved far into the Middle Ages. The houses of the country people were sometimes hollowed out of the earth and covered with a sort of "tumulus," formed of earth and heaped-up stones, on pieces of wood radiating from a central post. An opening cut on one of the sides of this heap served as door and window, the smoke of the fireplace escaping by a hole cut in the "tumulus." We have seen in the mountains of Cantel dwellings of this kind which seemed very ancient, and were certainly of a very remote fashion. It is unnecessary to say that art did not enter into any of this class of dwellings.

Certain cottages of Bocage and Brittany have some resemblance to these, in that the interior floor is lower than the ground outside, and the roof covered with thatch descends almost to the ground. But these are not conical in form, and they are covered with double-sloped roofs, which have two gables of rough stone or timber panels filled-in with clay.

As we approach the borders of the Rhine, in the eastern provinces, in the mountains of the Vosges, and near the small lakes of Gérard-

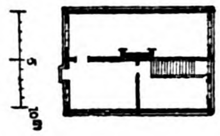

Fig. 43b.

mer and of Retournmer, we still see houses of the peasantry displaying all the characteristics of the early log-construction. Low and broad, made to resist storms and to support snows, they look very strong. Nearly all these houses have three rooms on the ground-floor, and four under the roof (Fig. 43 *b*).

The plan, *A*, of one of these houses, taken on the ground-floor level, shows the entrance-room, *B*, from which we pass into the large room, *C*, or into the back room, *D*, in which the only staircase mounts to the first floor under the roof. The room *C*, lighted at both ends, is used by the family as an eating and sitting room, and in this room, also, the food is prepared. A large chimney with piers, back, mantel, and flues of stone is carried up through the roof. The chimney is the only part of the building, except the base, which is not of wood. The roof is made either of tiles or sandstone schists, or slabs cut out of sandstone; on it are piled heavy stones. These houses are raised on foundations one metre high all round, formed of large blocks of sandstone. A wooden partition composed of the trunks of trees very roughly squared separates the dwelling in the middle of its length, and supports the extremities of the rafters. The ends of this partition corbel out on the two gables and form a very pronounced overhang. A floor of joists is borne on the three parallel wooden walls. These hovels are only lighted at the gable ends. They are evidently of a very old architecture, closely resembling that of the very interesting old Swiss houses.

On the borders of the Garonne, in Languedoc and Provence, are found the prettiest rural dwellings, of the sort much affected by the old painters. The Roman tradition has survived in purer form in these countries than in any other part of France. The peasants' houses here are large, roomy, low, set toward the east in the most favorable manner, with porticos, or, more often, low sheds, to protect the inhabitants, who, in this mild climate, do their work outside of their houses. In the plains of Toulouse, in Ariége and Aude, on the coast of Limoux, one sees, in the midst of groves of century-old trees, houses built in this way, relatively very ancient; that is to say, dating from the fifteenth century. However, houses built here to-day in plain brick or pebble-dash follow exactly the same plan. **The people of these provinces have always been agricultural and attached**

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to the soil, and have made few modifications in the local customs since the fourteenth century. Figure 44 is one of such rural houses.

The system of working the fief farms on shares was practised in the provinces of Languedoc in the Middle Ages exactly as it is to-day. The peasants who held these farms ran fewer risks than those who farmed for a season, or who obtained a territorial grant by paying a stated rent, and they lived in a state of complete security. This explains the character of ease observable in the rural dwellings of this country, and was the reason of their uniformity during several centuries.

In the North, and particularly in Normandy, the system of owning on shares, or of perpetual grants at a fixed rental, was generally replaced by the system of limited leases in the thirteenth century. The barons preserved the ownership of their lands and simply ceded the cultivation of them to husbandmen for a limited time and on settled conditions. "Several causes," says M. L. Delisle, "favored the development of these holdings and made them preferable to perpetual grants, which only were known in the first centuries of feudalism. In the end, however, it became evident that the rent stipulated by the contract of enfeoffment lost, with time, the greater part of its value. It was an inevitable consequence, not only of the depreciation of moneys, but also of the revolution which affected the relation of money to the article of consumption. On the other side, the waning strength of the feudal *régime* tended to deprive the lords of the principal means which they formerly possessed of plundering their enfeoffed domains .They were led to treat with the farmers, and so relieved themselves of the expense of improving and of plundering their lands, and were no longer dependent on the fortune derived from their rents, whose nominal value was not altered, but whose real value became more and more insignificant." Sometimes the needy baron forced the farmer to pay down on the signing of the lease the total amount of his rental for several years: It is evident that these were in truth terms onerous for the proprietor, and tending to enrich the laborer. In Normandy the rural dwellings became of considerable relative importance, and were modified more rapidly than in any other province.

Fig. 44.

On the Mediterranean coast we occasionally find country-houses in the shape of a tower or small turret belonging to a very ancient epoch, but these domiciles were more often inhabited by pirates

Fig. 45.

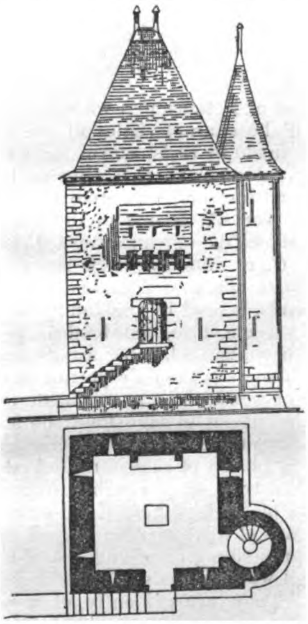

Fig. 46.

than by agriculturists. There are several of them between Toulon and Cannes. Figure 45 gives one of these, which is still entire, built on a bluff at the entrance of the village of Cannet, near Cannes, and about four kilometres from the sea. It consists of a square tower having two stories and a ground-floor, without communication with the outside. The door, raised three metres above the ground, was accessible only by means of a ladder, which could easily be taken in to avoid troublesome visitors. The first story, or, more often, the second (for there is no communication with the ground-floor, except by a trap in the floor of the first story), is broken by six machicoulis in the form of scuttles, and there are no windows. The first floor has no opening except the door. From this floor, that of the machicoulis is reached by means of a wooden ladder. The twisted ornaments which decorate the lintels of the door indicate a very ancient epoch.

At Cannet this tower is known by the name of "the brigands' house." The upper story under the roof is arched in rough stone. There are still to be seen at Corse several buildings of the same character.

Country dwellings, arranged so as to be a refuge for men living in isolated places, and probably at odds with their neighbors, are found also on the western coast. One of the best preserved and most interesting is found near Bordeaux (Fig. 46). It was formerly surrounded by a fosse filled with water. From the level of the water, a staircase of twelve steps laid in the wall led to the raised door. Probably a plank was thrown across the fosse when any one sought to enter. The door opened into the single *salon*, which was provided with a chimney and lighted by a small window and six loop-holes. They reached the cellar through a trap cut in the middle of the room.

The spiral staircase ascends to the second story, which has a chimney like the first; a sort of cage, with loop-holes and machicoulis, hangs from the wall above the entrance-door. There are several of these dwellings on the coast between Bordeaux and Bayonne, and even beyond as far as Saint-Jean de Luz. It is very probable that they date from the English occupancy of Guienne. In Suffolk County, in England, is a small place (Wenham Hall) built in brick after this same style, which dates from the end of the thirteenth century. It forms a parallelogram, with a spiral staircase in a tower at one of the angles. The entrance is raised, and is reached by steps set in the wall.

The "*maisons croisées*" of the cemeteries are worthy, too, of note. They were free and beyond the reach of the secular laws, being under the guardianship of the monasteries, and were famous as the refuge of pilgrims or sick persons. Their distinguishing mark was a cross of wood upon the roof-ridge.

THE END.

COMMUNICATIONS

THE DEMAND FOR THE CLERK-OF-WORKS.

EAST ORANGE, N. J., December, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—I am glad to see a disposition in the profession to require the services of clerks-of-the-works, at buildings which its members may be required to superintend, and that you are ably advocating the measure.

The present fee of five per cent is barely sufficient to pay for a well-considered design, with the necessary detail drawings and specifications, and without an additional fee, the architect should not be expected to devote the time to supervision which the average client now demands, and which he thinks he is liberally paying for. The client should pay the salary of a clerk-of-the-works; the architect would be relieved from much that is disagreeable and vexatious — and as a result could devote more time to study, to the proper development of his plans, and ultimately, to the best interests of his client.

A conscientious architect will often pause and consider whether he is best following the dictates of duty by devoting more time to supervision and less to proper thought and consideration of detail in the office, or *vice versa*, and frequently, when it seems imperative, from circumstances, to take the former alternative, it is at the cost of evening work — time which should be devoted to study, relaxation or social intercourse.

An architect has not only to deal occasionally with dishonest contractors, but with ignorant or incompetent ones, and their careless employés. To maintain his reputation, or to satisfy himself that the work is being properly performed, he will often find himself devoting more time to one building than is just to himself or other clients; and when the contractor discovers that he understands himself thoroughly, he will leave his men to the general instructions of the architect, when visiting the work. An architect frequently has a client who is unscrupulous, fault-finding, and who thinks he pays one for his whole time during the erection of a building.

As supervisor, the architect is supposed to be and to do about as follows: — to be an expert in every material and work that enters into the construction of any building, competent to judge quickly whether the contract is being complied with; to see that the different trades follow in prompt order, and that each branch of the work is completed to such point that there be no delay in general progress; to look after the construction of interior or other works in the shops; to instruct divers mechanics on points where they may be at fault; to have general care of the building that it be not damaged by the elements; to attend to correspondence (under certain circumstances considerable, even for a house of moderate expense); in short, to be "spotter," general foreman, clerk and janitor.

There are architects most able in design and ingenious in planning, yet who have not the slightest mechanical or constructive skill,

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whose whole time is most successfully passed in the office among their designs. How can such a one make a complete success in superintending? Another may be so engaged at his office, by an extensive practice that he has absolutely no time, had he the taste and inclination, to devote to constant supervision.

An architect should be spared the petty annoyances outlined above; they should be relegated to one fitted by experience and taste to undertake the task, and being in accord with the architect, would, under his general instructions and occasional inspection produce more satisfactory results than is often achieved now, be the architect ever so faithful and conscientious in his superintending. I trust that the time is not far distant when clients will concede not only the necessity but the advantage to themselves of employing clerks-of-the-work, and thus afford the architect more time in his office, where he rightfully belongs and where he can evolve his designs to the best advantage of all concerned.

Yours respectfully, S. W. Whittemore.

THE PROPOSED NORTH RIVER BRIDGE.

Chicago, Ill., December 18, 1888.

To the Editors of the American Architect: —

Dear Sirs, — The design for the proposed North River Railroad Bridge at New York City, published in a recent number of your paper, is so striking as an engineering problem and will be so graceful and dignified a monument if erected, that I cannot forbear to criticise one of the minor details which seems to be out of harmony with the other portions of the work.

I refer to the attempt to make an architectural composition by putting architecture on top of the towers. The construction of these towers is of steel, over which is placed an architectural cap of cast-iron in imitation of stone, the naked constructive work showing below. The effect reminds one of the African chief who adorned himself in a European costume consisting of a stove-pipe hat and linen collar. It needs no argument in this day to prove that this cast-iron work is in bad taste, either from an architectural or engineering standpoint.

Another objection to the design of the towers is that the upper cable is made to rest on a slender mullion while the massive corner piers have apparently nothing to support. Of course any architect knows that the cable must be supported inside independently of this mullion, but it is not sufficient to say in regard to an architectural design that it is actually strong. It must *look* strong and the piers or columns that support heavy weights must appear sufficient to perform the duty imposed upon them or the design will be a failure no matter how strong the actual construction may be.

The difficulty of giving artistic forms to constructive iron-work has long been recognized and the problem is one worthy the study of the best engineers and architects, but it is well-known that success does not lie in the direction of concealing the construction by a mask of cast-iron which in turn is made to imitate stone.

Very respectfully, N. S. P.

THE TRAVELLING SCHOLARSHIP FOR NEW ENGLAND ARTIST PAINTERS.

To the Editors of the American Architect: —

Dear Sirs, — If you will kindly tell me how long a student must reside in New England to qualify himself for the "Travelling-Scholarship for New England Artist Painters," spoken of in your issue for December 1, 1888, you will very greatly oblige one who hopes to be benefited by it.

Respectfully yours, Pictor Ignotus.

[We have referred this question to the authorities of the School of Drawing and Painting of the Boston Museum of Fine Arts, and receive the following: "Resident of New England is understood artistically; that is, pupil of a New England School or master, and is perhaps not very well expressed. But the examination is over for this time." — Eds. American Architect.]

THE ADVANTAGES OF THE ARCHITECTURAL COURSE AT COLUMBIA.

Boston, Mass., December 17, 1888.

To the Editors of the American Architect: —

Dear Sirs, — Referring to the item in the *American Architect* of December 8, in which "Columbia" is given, unquestioned, the first place as an American School of Architecture — I wish, as a subscriber, to ask why the editors are so decided on this point. If not inconsistent, will it be possible to give some reasons — why that question admits of no doubt?

Respectfully, T. R. Kimball.

[Our correspondent could answer his own question after thoughtfully reading and comparing the descriptions of the several architectural schools which we have recently published. The special advantages of the course at Columbia are: a corps of instructors who have had a long and wide experience; a compulsory course of study of four years' duration; a superior equipment; a Board of Trustees and Faculty thoroughly broad-minded and progressive, and, not least, the advantages of location. — Eds. American Architect.]

A CORRECTION.

December 24, 1888.

To the Editors of the American Architect: —

Dear Sirs, — I notice an unfortunate error in the last letter from Washington. The answer of Mr. Green, C. E., to Senator Hale's question in reference to his position as superintendent of the Congressional Library, should read "I am *not* under the architect," whereas it was printed, I am under the architect. This omission makes the difference between the architect as the head, and the engineer as the head. His advice that a building should have one head is good; while the supplemental clause, making the superintending engineer that head, is radically wrong, and likely, if unnoticed, to eventuate in the army engineers monopolizing public buildings, and the country being filled with more uncouth, unartistic and monstrous masses of stone, brick and mortar, than is now the case; as well as the educative effect of good work being lost to the community at large, and the architect on such work being turned into the draughtsman. Washington Correspondent.

THE OWNER'S ACCEPTANCE OF A BUILDING.

December 21, 1888.

To the Editors of the American Architect: —

I would like to have some information in regard to taking possession of a building. A contractor had plans drawn for a private school-house with residence and took the contract. It being in another town, so he put there a foreman to attend to it and build in accordance to plans and specifications (the other party had also a set of plans), the party representing the owner sent from time to time parties to inspect building, making changes, the owner calling there also several times, also making changes. The local builders made complaints to the owner, but on examination they were not verified: the owner made no complaints during the work.

Finally the owner was notified by contractor that the building was completed, and to call and accept it. The owner called, moved in, and did not object, and lives in the building. I understand three-fourths of contract has been paid, but he refuses to pay any more. I am called in as an expert, but I am under the impression that after having been there himself, and having had other parties there to inspect work, and taking the keys without any objection, that he formally accepted the work and has to pay balance due to contractor. After having taken possession, he made all kinds of changes, without notifying contractor, and wants me to charge it to contractor's account.

By letting me know the customary rules or referring me to similar cases, you will confer upon me a great favor.

I am yours respectfully, Subscriber.

[The law is well settled that the owner does not accept a building by taking the keys and living in it, nor does he thereby waive in the slightest degree his right to have the contract fulfilled to the letter before he pays the contractor. His visits to the building while in progress do not alter the contract, or put him under any obligation to accept work not in accordance with it; and if he orders changes at those visits, he only makes himself liable to pay a reasonable price for them, if they increase the actual cost of doing the work. Whether, after moving into the house, he can have changes made by other parties, without notifying the original contractor, and charge them to the contractor's account, is a different matter. If the changes are altogether outside the contract, he is, of course, not entitled to make the contractor pay for them. If they were necessary in order to bring the building into conformity with the contract, he ought to have notified the contractor that they were required, and have given him reasonable opportunity for making them himself, before employing other persons to make them; and it has been held abroad that where this notice was not given, the contractor was not liable for any part of the expense. Aside from legal technicalities, however, it would probably be fair to both parties to have the contractor pay what it would have cost him to make the work conform to the contract, as nearly as this can be estimated, and let the owner pay whatever it actually cost beyond this. — Eds. American Architect.]

LAYING MASONRY IN COLD WEATHER.

December 21, 1888.

To the Editors of the American Architect: —

Dear Sirs, — Can you tell us anything about laying masonry in cold weather, whether it is or is not desirable to use much or any cement, and if the addition of salt would help to keep out the frost from the mortar of the foundations? We are just about to start a large warehouse, and the probability is, that most of the work will be done in very cold weather as the building *must* be done by early spring. Also, what is the experience of Boston architects with colored mortar in cold weather; Can or cannot this be used? By an early answer to these questions you will greatly oblige,

Very truly yours, Rogers & MacFarland.

[For a brick building, built rapidly, and with the thin walls and poor mortar commonly employed here, cement is practically a necessity, although the more cement a mortar contains, the more it is injured by freezing. The addition of salt will considerably diminish the expansion and disintegration of the mortar by freezing, but it is likely to cause white "saltpetering" on the walls, and will tend to keep them permanently damp. For the foundations we suppose cement alone will be used, and here much the best way will be to heat the stones, lay them on a mild day, and immediately cover with hay, tanbark, manure, earth, or some other substance which will keep out the frost. In any case, we strongly advise the architects to warn the owner, at the outset, that if he insists on having masonry done in the winter, they will take no responsibility for the consequences; and that while they will use such skill as they possess in the direction of the work, winter-built brickwork cannot be made as good, under any circumstances, as that built in summer, and if the season should be unfavorable, with sudden changes of temperature, it may be very much worse.]

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As to the use of colored mortar in cold weather, if the joints of the facing are of the colored mortar for four inches or so from the face, the work can be made to look tolerably well by repointing the worst places in the spring. If only an inch or so of the colored mortar is put on, at the front edge of the joint, as is sometimes done, it is likely to fall out in places next summer and show the white behind it. One thing, which those who build in winter should bear in mind is, that the sun is as much to be dreaded as the frost. In February and March new walls exposed to the East or South are very liable to freeze at night, and thaw by day, on the side facing the sun, bending over toward the sun in consequence. It is not easy to prevent this, but it should be carefully looked out for, by frequent plumbings of the walls, and coverings or shading employed.—Eds. American Architect.]

NOTES AND CLIPPINGS.

Funeral Ceremonies in Paris. — In all countries death and the ceremonies of burial are sad and repulsive. In France, perhaps, decency is observed as well as in any country, thanks to the excellent organization of the Compagnie des Pompes Funèbres, which forms, so to speak, the administration of all the churches in Paris, exercising on their behalf the monopoly of funeral ceremonies. This company, whose monopoly is regulated by law, is a vast enterprise, possessed of exceptional resources, an immense number of horses and carriages, a numerous and well-disciplined personnel. Every year it takes charge of about 50,000 funerals, about half of which are those of the poor. Thanks to this enterprise, even the poorest citizens are buried with some show of decency and in conformity with strict rules. The administration of the Pompes Funebres is situated in Paris in the Quaie d' Aubervilliers. It is a big, heavy, white stone building, built round a vast glass-roofed court-yard. To the right and left of the entrance doors are the offices of the director and the bookkeeping department. In the court-yards are the store-rooms, the stables, the coach-houses and the harness-rooms. Everything is black, sombre and silent; everything is rigorously numbered and ticketed, classified and arranged for immediate use. The porteurs, or bearers commonly called *croquemorts*, have a big room furnished with oak benches, where they assemble every morning, 400 in number, to await orders — gloomy, serious, clad in various styles, some with blouses, but most of them in jackets. Over this room are other rooms with cupboards, running down the middle in double rows. Each cupboard is numbered and fitted with a lock, the key of which the correspondingly numbered *croquemort* keeps. In these cupboards are kept the uniforms of the bearers, who dress before going out on service and undress when their service is over, only wearing their regulation costume while on duty. The masters of ceremonies have each a private room to dress in. Their uniform consists of a cocked hat, coat, knee-breeches, silk stockings, buckled shoes, a court sword and a wand. This personage is paid by the day, so much for each funeral. His duty is to arrange the procession in proper order, to fix the order of the precedence among the mourners and to start the funeral. Beneath the vast building of the Pompes Funebres are cellars dimly lighted with gas-jets and full of rows and rows of coffins of all sizes and qualities. This cellar contains a stock of 15,000 coffins ready for use, varying in length from six feet two and one-half inches down to twenty-seven and one-half inches, which are the regulation maximum and minimum sizes of dead French humanity. For persons taller than six feet two and one-half inches a coffin has to be built on purpose and to order. On one side of the cellar are the lead coffins, and in one corner a stock of square boxes in which coffins are packed for travelling by rail or steamer without attracting attention. Near the door of the cellar are some huge coffins, with a circumference of six or nine feet, destined for the accommodation of very obese corpses. Likewise near the door are thirty hand-carts of peculiar form, on two wheels, painted green and lined with black; these carts are used only when some terrible epidemic is decimating the population. The price of the coffins, of the inner lining and of the covering pall, are all regulated by an immutable tariff. In 1870, during the siege, the little hand-carts, painted green and lined with black, had to serve universally as hearses, for all the horses had been killed for food. —*New York Mail and Express.*

One Way to Secure a Commission. — The selection of M. Chapu as the sculptor for the statue of Honoré de Balzac, although approved by Frenchmen, has caused bitter disappointment to M. Marquet de Vasselot, who for twenty years has had one fixed idea, viz., that he was destined to make a statue of the novelist. The committee having charge of the subscriptions avoided a competition, and sought a sculptor by visiting the *ateliers* of a select number of sculptors, and discussing the subject with the owners. Finally, it was considered that the wisest course was to offer the commission to M. Chapu. The decision dispelled all M. de Vasselot's dreams. He had prepared himself for the work by making four or five busts of Balzac, he had made models of a memorial, and had so constantly studied the novels that he considered himself confident to create figures of at least three hundred of the characters. M. de Vasselot would not be called a very successful sculptor, for he has obtained few medals, and, when an artist has formed a definite plan as he did, he is not likely to care about any other. For M. de Vasselot believed that if he could make his mark by the monument of Balzac, then the future was secure. The committee having failed, the sculptor has turned to his successful rival and has put the circumstances before him with an appeal to his generosity. To a man in M. Chapu's position, what is one monument more or less, while the victory means loss to M. de Vasselot and misery to his family? In a case of the kind, what is to be done? If M. Chapu gave up his commission, would the committee give it to the sculptor who was so eager to obtain it? Many claims might be set up, and the task of the committee would become oppressive. The narrative recalls the disappointment which was felt by Benjamin Haydon under similar circumstances. All his life he was insisting on the duty of the State to give commissions for mural pictures, and he was dreaming of the time when he was to receive them. His joy was great when it was announced that the Houses of Parliament were to be adorned in that way. He took part in the competition, and the smallest prize was not awarded to him. M. de Vasselot is, therefore, not the first artist who has been foiled in the ambition of his life. — *The Architect.*

TRADE SURVEYS.

There could be no better time than the present to note two or three of the fundamental difficulties with which business interests, high and low, are obliged to contend. The worst feature of these difficulties is, that they promise more complications. The first one is the enormous producing capacity of the country, the excessive supply of railway facilities, the large volume of capital not particularly employed, and further, the growth, daily, of power capacity, etc. Without theorizing, it may be said that extraordinary abundance of production and productive capacity ought to be occasion for rejoicing, but as trade is organized it is not always so. The capacity to consume does not increase with the capacity to produce, and here the trouble starts, pointing to periodic over-production, depression and disarrangement of trade and financial machinery. Ways must be found to increase consumptive capacity before the commercial perturbations will cease that upset all calculations and make trade more or less of a lottery. This is fundamental. The world has given itself over to the workshop, to production, to the harnessing of power in every shape, forgetting the end of effort was individual development and progression. Without talking book or theory, or getting away from stern everyday facts and conditions, it must be said that too little attention is given to markets and to selling, and too much to shops and buying. The volume of business is limited by the buying capacity of the people. It is the business of no one to make markets or to see to it that the people have two dollars to spend where they have one now. But it is just this problem that confronts us. Purchasing power can be greatly increased. Trade and traffic is overdone, is over-supplied with talent and energy and capital. This is seen in extraordinary railroad building, in enormous shop building, in three million tons rail-making capacity when demand calls for half this amount, in architectural capacity sufficient to transform every house in the land into a palace, but not the means among occupants to have it done; in store-keeping capacity so abundant that ten thousand traders are crowded out or tramped down every year. The fundamental evil of the age, to reiterate the fact, is over-capacity, over-energy, when compared to purchasing and consuming capacity. Social evils in past ages were corrected by wars, and in these later days by commercial upheavals and depressions. Causes are still at work in that direction. Only far-seeing wisdom can eradicate these causes, but they cannot be cured by theorists in educational cloisters. The masses are doing this work for themselves as well as untutored energy can do it. The slavishness of our industrial system must in due time go as black slavery went, for the very highest and best economic reasons. The masses produce in a certain sense too much and consume too little, for two reasons, first, compensation forbids greater consumption, and next, lack of time or leisure, or daily opportunity prevents the formation of that habit and those desires which underlie a greater consumption. Economists are now willing to accept the theoretical truth of such statements, but say there is no available remedy.

What the country needs to increase its prosperity is an extravagant working class, who are able to be extravagant in the use of food, clothing, houses, books, etc. The foundation for this extravagance is being laid through the scattering of the millions over the land, and in the consequent diversification of employment and the multiplication of industries. The second fundamental difficulty, which, however, is now only a possibility, is the money question. At present money is abundant, interest is low, credit easy, collections readily made, money is begging for employment, and all is right. But a transition is to take place, and in the step lies the crisis. The banking interests propose to inaugurate it by retiring the people's greenback, and to legislate to themselves, through their servants in Congress, the right to handle the nation's money. The mighty business interests as usual are too busy making profits and margins out of their dollars to pay much attention as to who make the dollars, or how they are made. The recent Royal Commission votes, six to six, for and against the gold standard, and thus leaves it both an open and a closed question. American banking interests lean to the gold basis and would stop silver coinage, while purely business interests would increase silver coinage and silver certificates as fast as possible. There are no clouds in the sky, and, therefore, there is to be no storm is the popular logic, which seeks to evade this question which is thundering along behind the horizon. The unexpressed business sentiment favors Government issues in accordance with the decision of the United States Supreme Court in speaking as to the functions of the Government. The banks will fight this position, and it will be the great political issue in the near future. Mere questions of policy affecting the management of railroad properties, the adjustment of tariff duties, the question of internal improvement and of coast defences and a merchant marine will all easily and naturally settle themselves in conformity with evident business and national interests; but the deeper questions of national finance and a social political economy cannot be settled by legislative enactment. They call for the higher education of the whole people. To-day the situation is better than it ever has been for progress in the right direction. There is no slave power, no money power, no railroad power, no political power to shake their rods over the people. Never had the people so strong a grip on Government and on the control of their interests, despite the cheap talk of trusts and monopolies. Labor has been disciplined into proper subordination; capital has been taught that there is a dead line drawn around its operations, and syndicates are learning that the driftwood of past ages has left snags in the commercial streams they are sailing up and down. Yet we are only in the infancy of trade-combinations. They must, of necessity, multiply. They are the sinners of the body politic. Their spread can do no permanent harm; each will find its counterpart like the interchangable parts of modern machinery.

The great engineers of the world's business will in the future not be supreme, but will run their trains and combinations on the block-signal system, and their switches will be turned for them by the people's agents in the signal-towers, no matter how long their trains are, nor what they carry. Every engine, to continue the figure of speech, will have a sort of interstate commerce air-brake under its boiler. As a people, we are simply learning how to do business on a larger scale. Under this progress individualism will grow, but a better set and class of men are needed in State affairs. The quality of our law-makers has not improved as has the quality of our mechanics and business men in all channels from the little counting-room to the office of the railway manager. Poor material is sent to legislatures. The importance of the business interests at stake call for as able and as practical men in legislative halls as sit in the chairs where are the brains that run and control the mighty business interests of the country.

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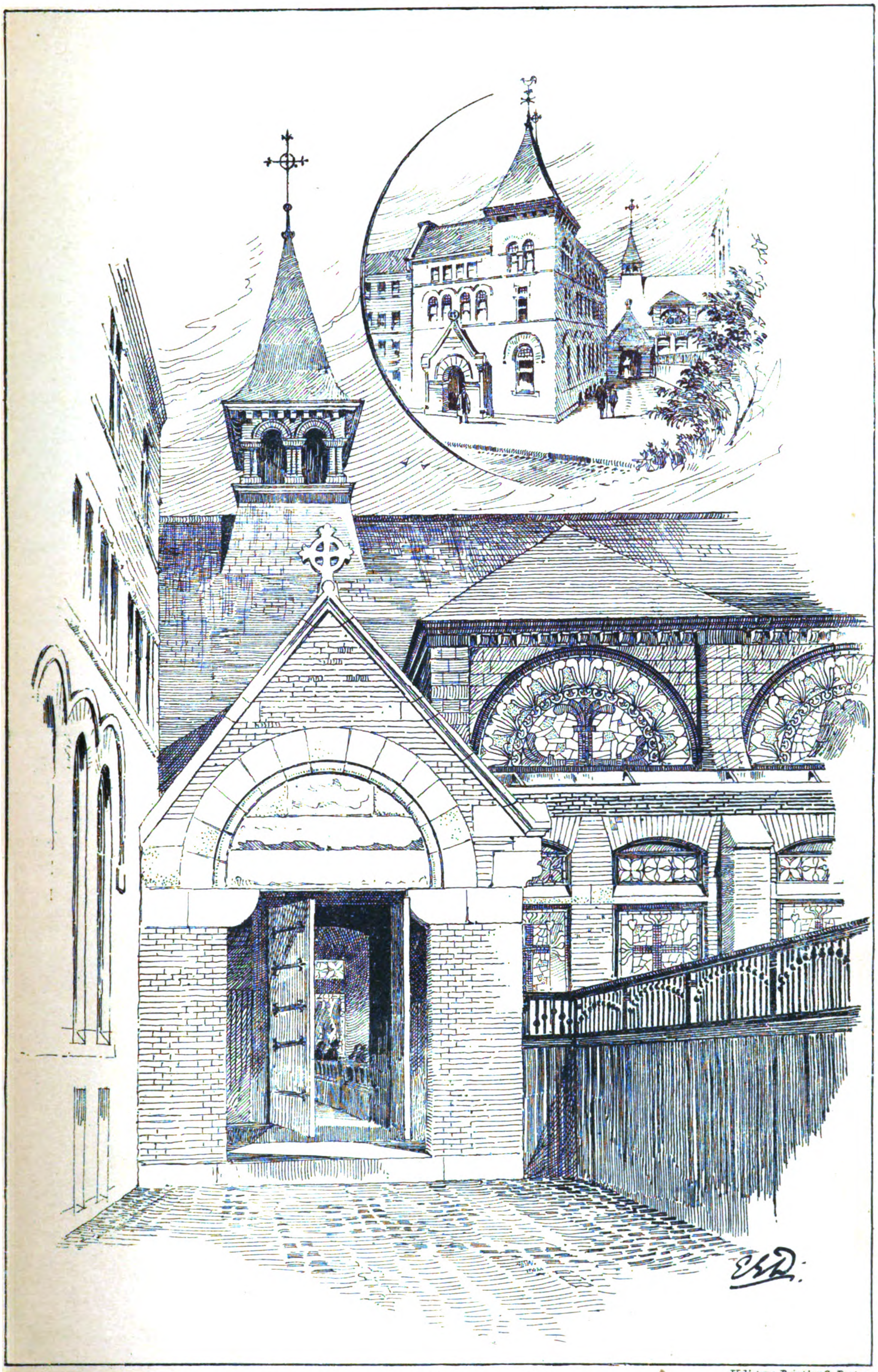

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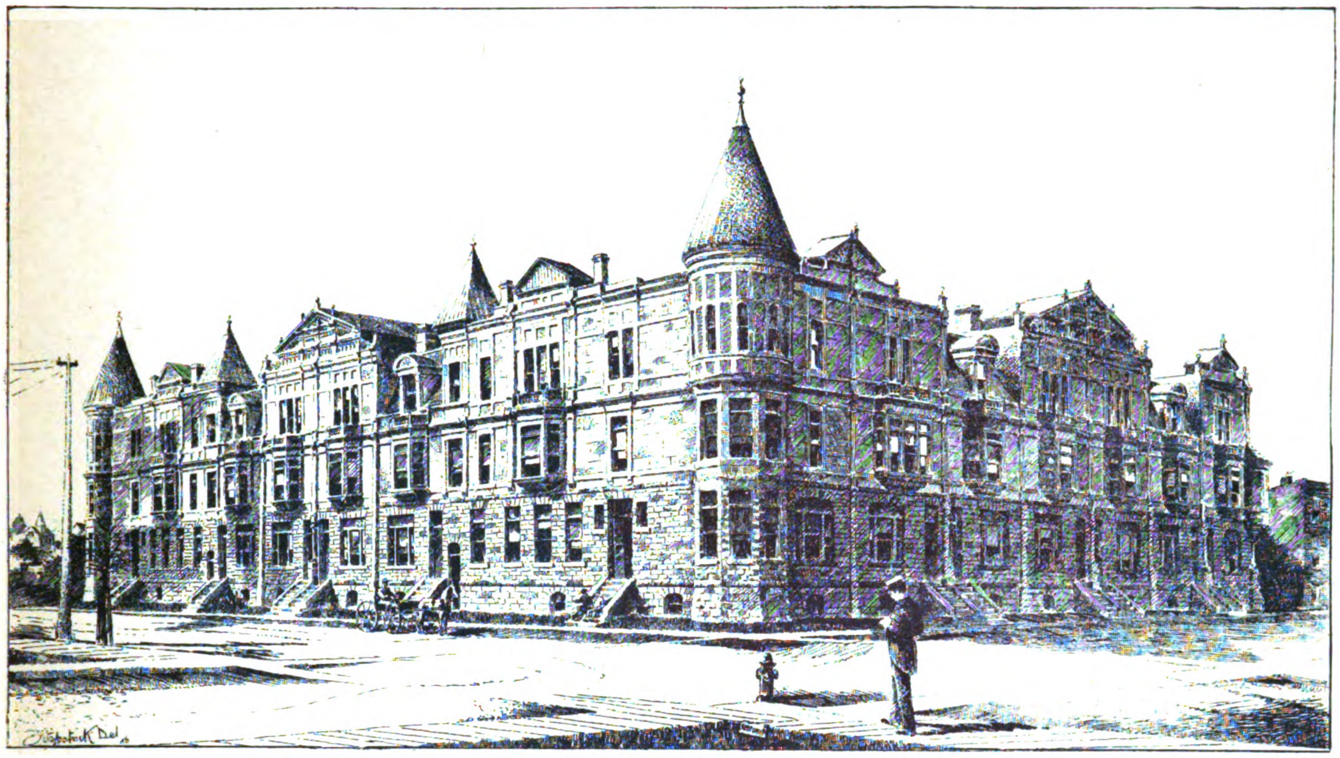
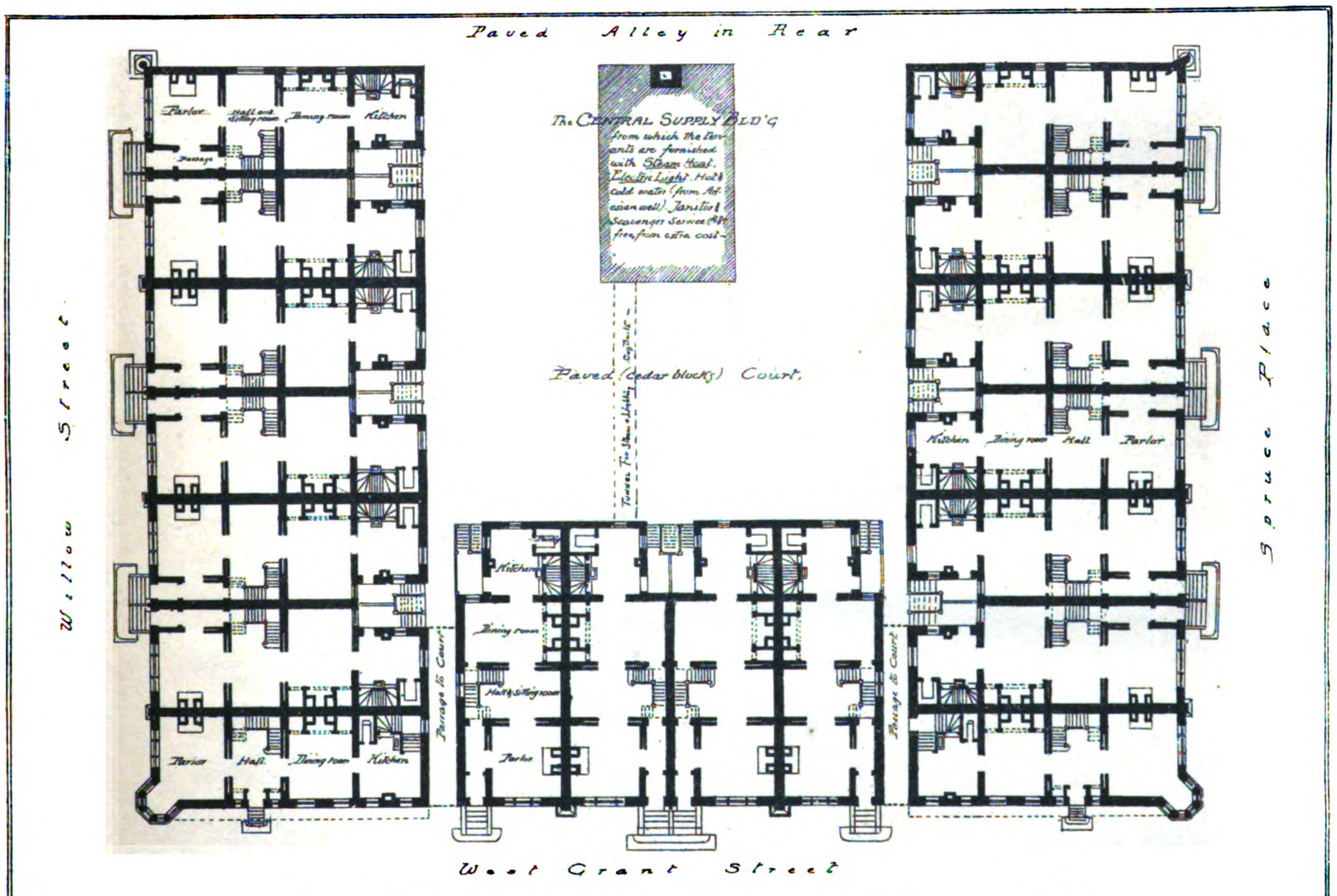


Central Park Terrace
Minneapolis Minn.
W. D. Kimball Archt.



First Floor Plan of CENTRAL PARK TERRACE, Minneapolis Minn.
Scale Twenty Feet to the Inch.
W. D. Kimball Archt.

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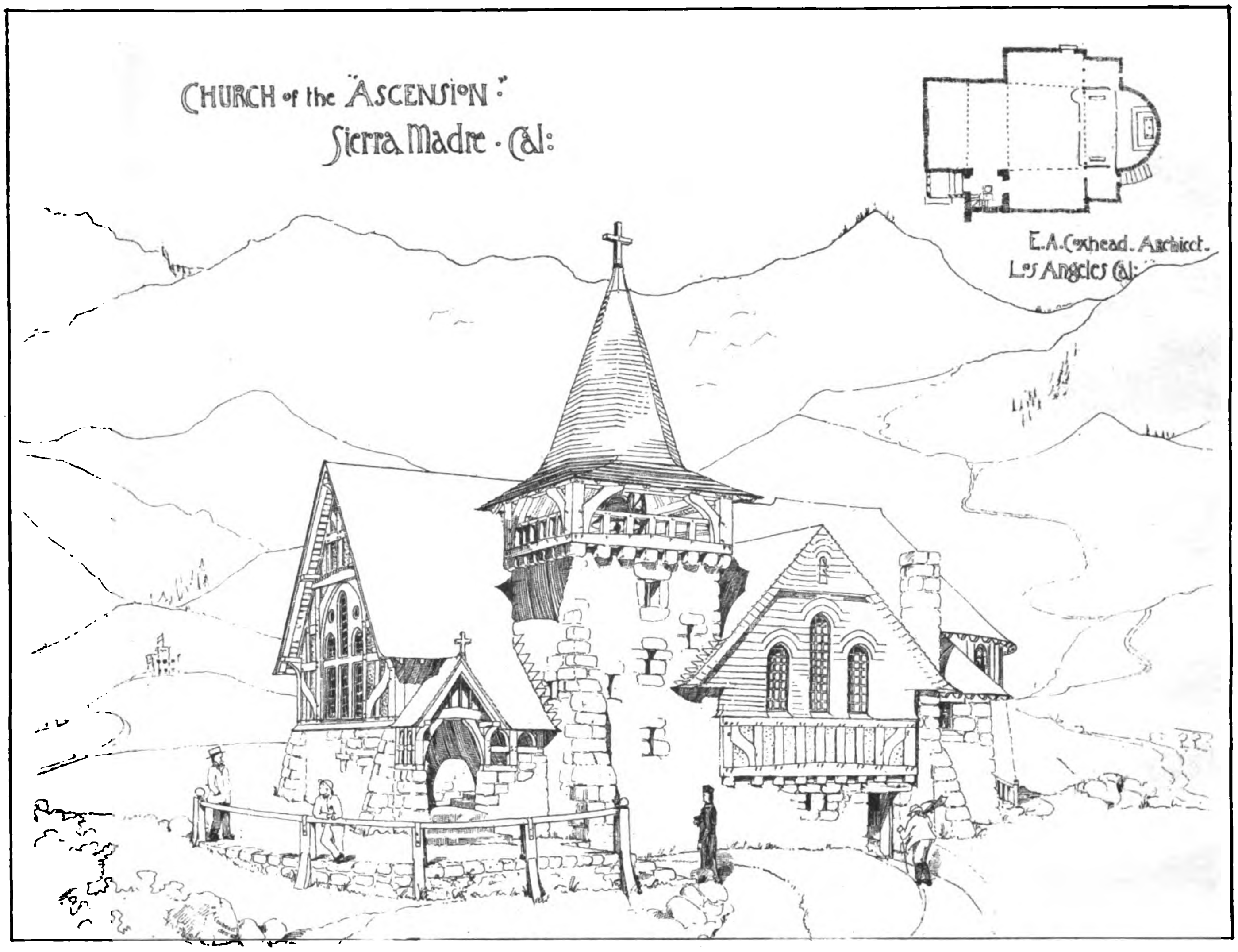

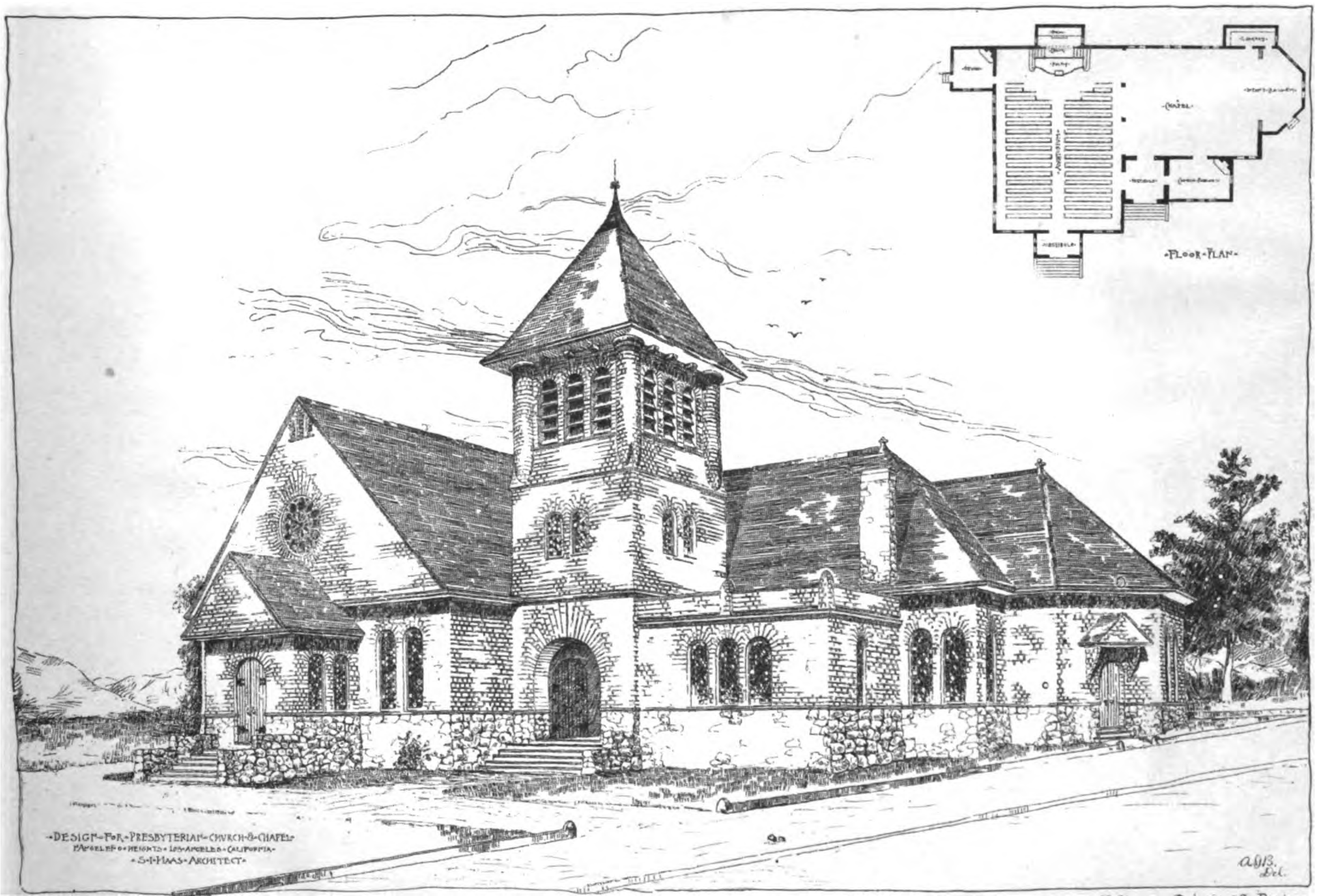

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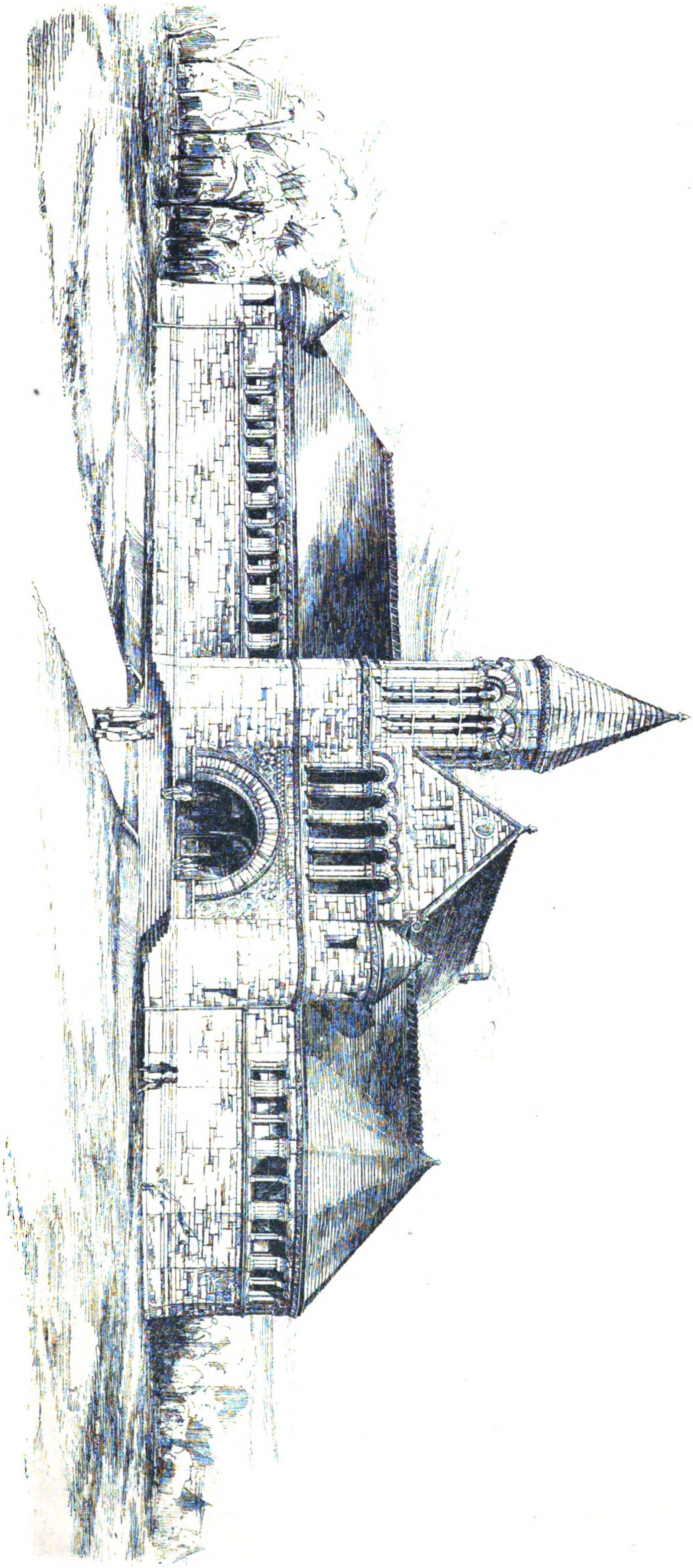

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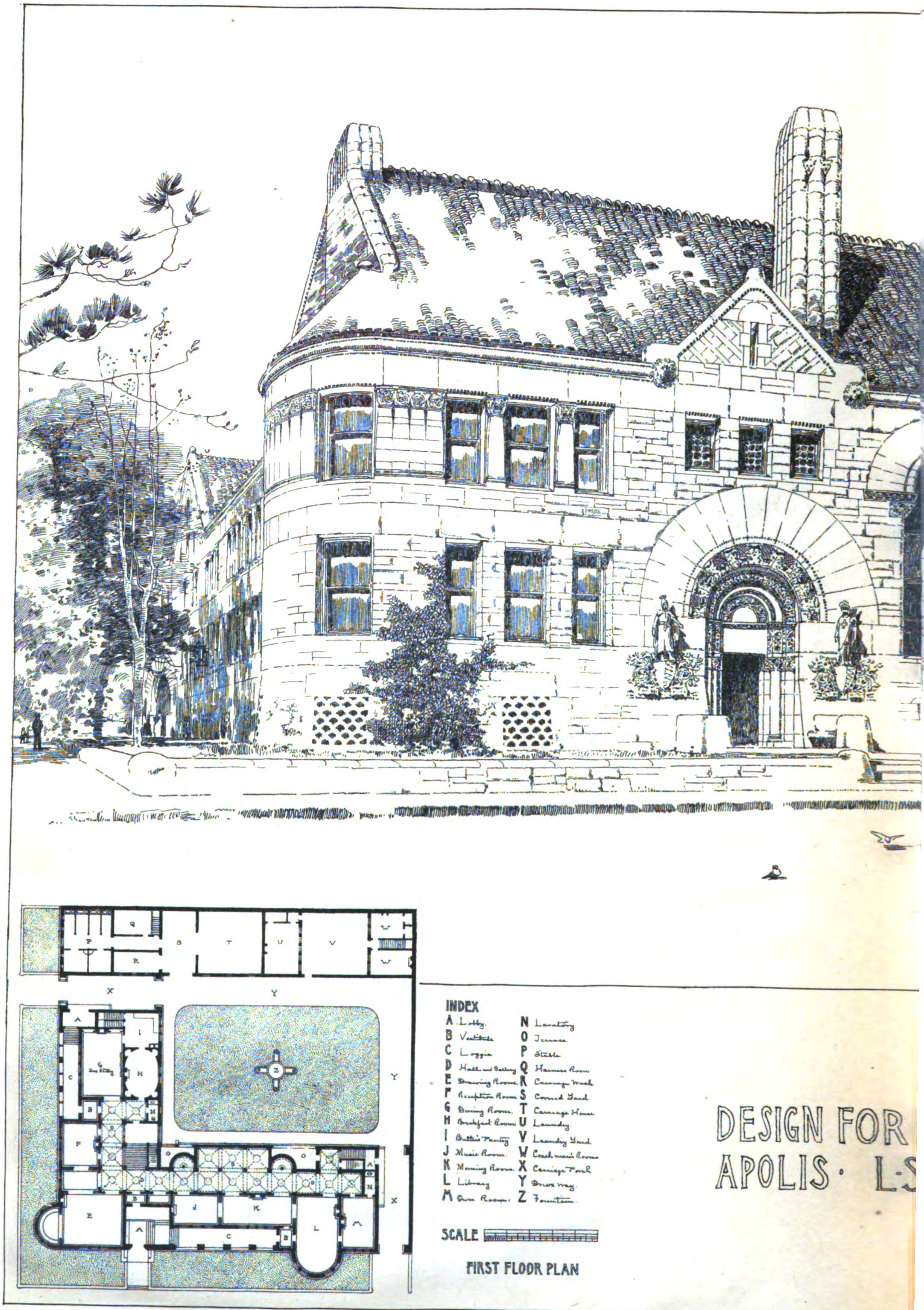

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RESIDENCE OF MR·CHARLES A·PILLSBURY MINNE-
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The American Architect and Building News

ADVERTISERS' TRADE SUPPLEMENT.

No. 73. SATURDAY, JULY 7, 1888. VOLUME XXIV. No. 654.

MODERN HEATING.

FATHER TIME as he journeys on his weary way in the twilight of this 19th century might well be surprised at the progress the world is making in every sinew of its industrial structure, and stop and wonder how and why we mysterious and active people are so different and more practical and less romantic than our predecessors were of a century ago.

Why do we want to change so wonderfully and rapidly, he asks? Why not be content with the good days of long ago? He would have us grow more in the way of Shakespeare's description of us as mere players on the World's stage. With our exits and entrances, advancing our growth in life from the infant to the soldier "seeking the bubble Reputation at the cannon's mouth," and not advancing into civilization and enlightenment as we would and must have it. Reputation in a peaceful and industrious manner, protecting ourselves when necessary by Brotherhoods, Labor and Trades Unions when properly managed and under right-minded leaders, against the monopoly of Trusts and the concentration of Capital of nowadays.

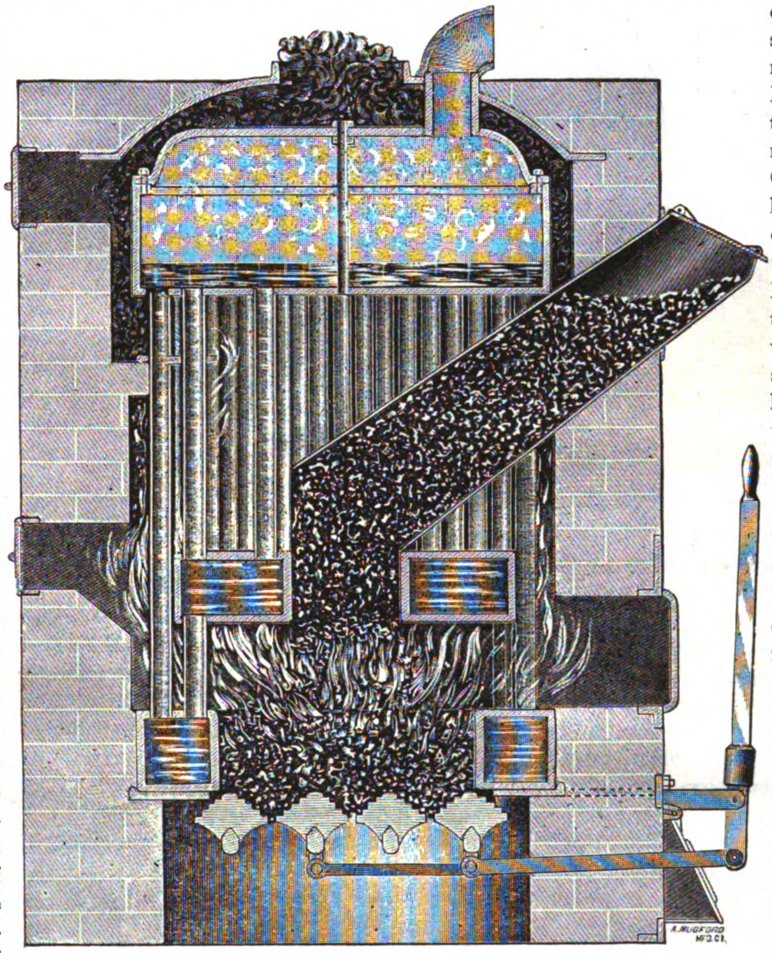
In this enlightened century as the rising generation grow in civilization, and progress in social reforms and life, they feel that they must bend all their energies and thought with each other to provide more to the comfort, welfare and happiness of the home, and have the convenience and ease of travel as a luxury, and true we do find that the home is showing the touch of the hand of Dame Progress in our crowded cities. Houses are being built side by side in as friendly a way as space will allow. All down the ages, home above everything else has commanded first our best and most sincere attention. Travel may be a pleasure to most of people with all its modern advantages, but as the poet well puts it,

> "Whatever realms to see where'er we roam,
> Our first best country is at home."

As to its architecture, this country has been making great progress within the last five years. Much of it has been pretentious and peculiarly vulgar and out of place. But it has begun now to show artistic features of a very high order. The best specimens are scholarly and refined in detail. We hope this reformation will continue.

This country is particularly severe in its winter seasons, with its snow and wind storms which come to us unawares oftentimes. Necessarily we must make ample and safe arrangements for such trying contingencies.

Scientific men tell us that as an agent for heating homes steam is the best factor. The natural laws governing the generation of steam, the absorption of the heat of the fire by the water, its conversion into steam, its transmission of this heat mysteriously hidden in the vaporous mass to the various apartments of the home, there to give off this heat by condensation in radiators reconverting it into water, returns to its heater whence it first came only to continually repeat the process.



The Bronson Steam Heater.

Prof. B. Silliman of Yale College, says: Water passing into vapor absorbs nearly six times as much heat as is required to raise it from 32° to 212°. This increase would render a solid body red hot by daylight, and still the steam produced by it has only 212° of sensible heat. Thus it is shown that the use of steam as the agent for heating is no longer an experiment, but is accepted by the public as the most healthful and agreeable agent now in use. To prove to you its popularity especially in New York City, where so many blocks of homes and stores are being erected every year, uptown and at its suburbs, we need merely to mention that Messrs. Clapp & Barron, New York agents for the Bronson Steam Heater, made by the Weston Engine Co., of Painted Post, N. Y., have just closed with a large contract to steam heat twenty-two apartment-houses uptown, New York. The contract distinctly says that none but this well-known "Improved Bronson," must be used in every house. The manufacturers of this heater are well-known and representative business men of Western New York, a firm of a well-deserved reputation and highly respected for their integrity in every detail in the business world. They have facilities which are unequalled for producing heaters in large and small orders promptly, and always prepared for any demand in this line. Their New York representatives are active and pushing business young men, and are in a position to provide for the comfort and happiness of the many and crowding homes now being erected within their jurisdiction. We commend them to your favorable consideration. They always take pleasure in answering inquiries, and will make plans, specifications and estimates free of cost to all parties sending them dimensions of the buildings they wish heated.

WESTON ENGINE CO.,
PAINTED POST, N. Y.

HAINES, JONES & CADBURY, manufacturers of Plumbers' Supplies, Philadelphia, Pa., have lately built extensive additions to their factories. They have now a wood-working department for the manufacture of Wash-

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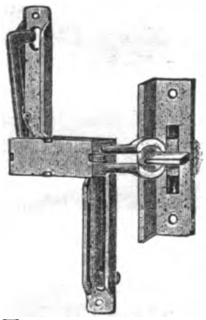
stands, Tub-casings, Closet-seats, etc. They have put in new and improved machinery and employ only the most experienced and competent workmen. This enables them to turn out good work at a small cost. Their magnificent show-rooms are well worth seeing, being filled with sanitary appliances of the highest order. Four complete Bath-rooms are fitted up, one with a Copper Tub, one Enameled-iron, another Tile and another with an all-Porcelain Tub. Each is perfect in its way. The closets manufactured by this firm are well and favorably known in every section of the country. Among some new and ornamental closets are the Embossed Electric, Wyoming, Buffalo. They are all "Wash-outs" and every one sent out is warranted to be perfect.

THE "TIMBY" BURGLAR-PROOF SASH-LOCK AND VENTILATOR.

Among the unique things that have of late been put on the market nothing is more valuable, comparatively, in the line of house building than the Timby Sash-Lock and Ventilator.

This device is not only novel, but quite effective for its intended purpose. It is designed to be set into the window frame, the centre of the lock in line with the centre of the meeting-rails of the sash, and is operated by means of a sliding thumb-nut on a face-plate attached to the inside stop. This lock is very simple in construction, easily operated, strong and durable, and automatically locks either or both sashes in any position desired, thereby affording the means of perfect ventilation, and at the same time perfect security against sneak-thieves. A locking device in the thumb-nut prevents the possibility of manipulating the lock from the outside when windows are left open for ventilation. The lock, therefore, accomplishes the double duty of affording at once security against forcible entry and ventilation to any degree that may be desired. It can be applied to any window, as it adjusts itself to varying thicknesses of sash or inside stops, and does not interfere with applying weather-strips or inside blinds.

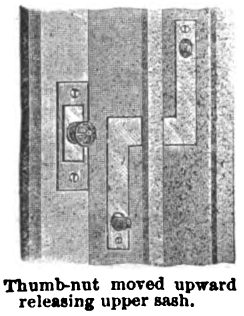
Fig. 1.
Back View of Lock and operating device.



Thumb-nut moved upward and bolt thrown back same as in Fig. 2.

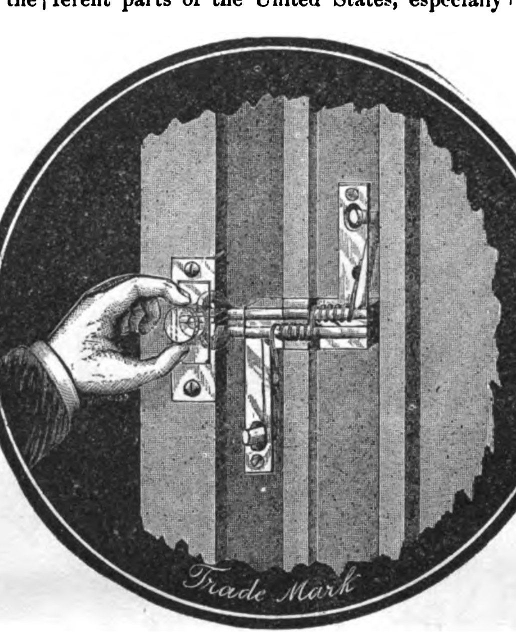
The accompanying illustration shows a section of window frame with the lock applied, with the thumb-nut moved upward, releasing the upper sash—the cut being semi-transparent, to show the inner construction of the lock, actuating spring, etc. The bolts are made from the best malleable iron, the case from wrought-steel, the face-plates and thumb-nuts from brass and bronze metal, highly polished and lacquered, presenting a very handsome appearance when applied. There seems to be nothing about the construction or operation of this device to render it liable to become disarranged; it should be very durable, and must form a very substantial and desirable lock, affording much greater security and convenience than the centre sash devices in common use. The circular of the manufacturers gives full and explicit directions for applying and operating, so that no difficulty will be experienced in attaching them. The device seems to have much merit, and we commend it to the notice of our readers.

Fig. 2.
Section of Frame with Lock applied.



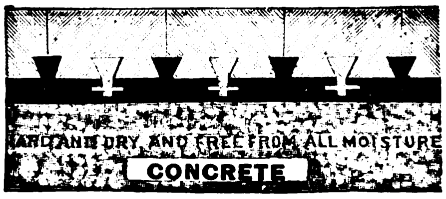
Thumb-nut moved upward releasing upper sash.

JENKINS & TIMBY,
Oswego, N. Y.

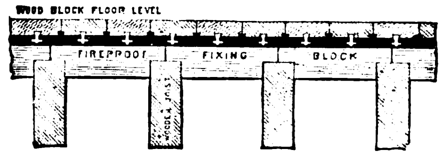


The "Timby" Burglar-proof Sash-lock.

NIGHTINGALE FLOOR SPECIALTIES.



The above is a section of the Nightingale Wood-Block Tiling Floor which has now been on the Market here fifteen months. It is being extensively specified by architects in different parts of the United States, especially for fireproof buildings for which it is particularly adapted, being a means of obtaining a wooden floor over such without the use of sleepers of any kind, the decay of which so frequently causes annoyance. By this system a thoroughly solid, immovable and noiseless floor is obtained, free from dry-rot and dampness and perfectly watertight, there being no space underneath or between the joints of the blocks for the harboring of dust and vermin. The weight on the floor is better distributed, consequently it wears evenly. When concrete is employed for basement floors, the Nightingale floor as a covering for same is just the thing for preventing dampness (which is so often complained of) and making a thoroughly dry and warm floor with a pleasing appearance and dispensing with the wooden sleepers usually laid to nail the finished floor to. The foundation of Cement Concrete is allowed to become *hard* and *dry* and *free from all moisture*, before the flooring blocks forming the floor are placed in position over same, each being bedded in a specially made Antiseptic and adhesive Composition which takes up and enters into the undercut grooves on the sides and ends of the blocks, and thus forms a hard and fast joint-binding them to each other and the Concrete foundation making it a matter of impossibility for them to be lifted without the aid of a hammer and chisel, and not even then without destroying the blocks. The Composition also prevents dry-rot and dampness. Several millions of feet of this floor have been laid during the last few years under Mr. Nightingale's supervision in England and Ireland, in places where parquet tiles and marble floorings are often laid, the advantages over such being its noiselessness, solidity, warmth, and the doing away of chipping, cracking, and working loose of the floor from the foundation. The floor is in in use the following buildings, and up to the time of writing it has been specified for use in *forty-six* other buildings in various places: Royal Arcanum Club, Brooklyn; Dr.



Brewster's House, Brooklyn; Dr. Wunderlich's House, Brooklyn; Lawyer Keogh's House, New Rochelle; Niagara Insurance Offices, New York; The Jessup Mansion, Spring Lake; Mr. Montgomery's House, Parkville; Mrs. Eames's House, Fordham; Robbins Island Club-House; Belvedere Hotel, New York; Masonic Club, Brooklyn; Western Union Telegraph Building, New York.

Section above shows a system of making a fireproof, immovable, solid and noiseless floor over wooden beams or joists, doing away with the rough boarded floor, also dispensing with all kinds of deafening, pugging, beam-linings, fitting in of wet concrete between beams, and the like methods of an unsanitary and destructive nature usually adopted. The fireproof fixing blocks are very light being composed of coal-ashes, cinders, plaster-of-Paris and lime. They are moulded to shape and are hard and dry and free from all moisture before leaving the factory and before being placed in position over or between the wooden beams. This saves caulking and like methods adopted and is indispensable to all who are and have been troubled and put to great expense by leaky floors. A perfectly level and well bonded floor is formed, strong and durable in all its parts, one solid compact mass. For a cheap, strong and lasting floor possessing the above advantage it has no equal yet placed before the public.

FIRE AND SOUND PROOF FLOORS.

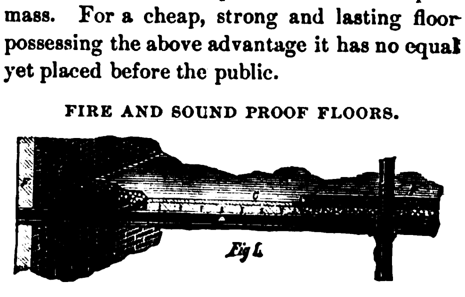


Fig 1.

A is the main girder resting on wall E and on pillar D.
B are the small iron joists resting on main girder A and on wall at other end.
C the iron joists B bedded in concrete and forming both floor and flat ceiling.
F shows a portion of the floor C laid with patent solid and noiseless Wood Block Tiles.

Section showing Flat Fireproof Construction where iron joists rest on bottom flange of main girder and in which all iron work is entirely protected from fire.

The illustrations above give a general idea

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of what is known as "Nightingale's Flat Concrete Construction," which is in use in hundreds of works, mills, mansions, barracks, factories, stores, banks, flats, offices, etc., in England. Small 3-inch by 1½-inch rolled-iron joists weighing about 5 pounds to the foot are fixed about 18 inches apart (forming a kind of network) and bedded in the concrete, resting at each end upon walls or girders as the case may be. The cement concrete is 5½ inches thick, including ½ inch of cement floating to a true level (which is allowed to consolidate and become hard and entirely free from all moisture) upon which rests the thoroughly seasoned wood-block tiles after being prepared in a special manner, each being bedded in a damp-proof adhesive and preservative composition, thus avoiding sleepers of all kinds and rendering the floor a solid, immovable mass into which neither fire, water, dust, rats nor vermin can possibly penetrate. This makes the floor fireproof both above and below. This system of fireproofing has been found to be economical, easy of adaptation and possessing great strength, rigidity and highly fireproof character. The floor is constructed so that it is entirely in one mass, consequently it is almost wholly free from lateral pressure. No thrust is transmitted to the walls, the walls being tied in and strengthened. It has been subjected at various times to severe tests, and has been accepted by the Insurance Companies on account of its fireproof qualities. It has been very thoroughly tested as to its sound-proof qualities acting towards sound as a brick wall towards sunlight and is therefore of the greatest utility in all public buildings. No better test could be given than a school-room for boys over a lecture or meeting room, and yet in cases where this system is in use, those in the lower lecture-room are absolutely ignorant of when or how the boys leave the room above. These advantages are of paramount importance not only in public buildings and offices, but also in apartment-houses.

The firm's name and address is the

NIGHTINGALE FLOOR IMPROVEMENT CO.,
151 BROADWAY, NEW YORK.

THE steam plant which is to be erected by the Ball Engine Company of Erie, Pa., at Union City, Ind., is nearly completed, and it is the purpose of the local company to get everything in readiness so that they can illuminate their city on the 4th of July. The Electric Light Company at Trinidad, Colo., have met with such pronounced sucdess that they have found it necessary to increase their capacity, and to this end have ordered another engine from the Ball Engine Company, of Erie, Pa. The Paterson Electric Light Company of Paterson, N. J., have their building nearly completed. The system to be used is that of the Thomson & Houston Company, of Boston, Mass., and will be the finest equipped station in the United States; the steam-plant consists of five 125 horse-power engines, which will be erected complete in every detail by the Ball Engine Company, of Erie, Pa. The city of Rome, Ga., will be lighted with electricity; the Thomson & Houston Company, will furnish the electrical apparatus and the Ball Engine Company of Erie, Pa., has been awarded the contract for one of their celebrated steam-plants. The Ball Engine Company of Erie, Pa., has been awarded the contract for furnishing power for the Atlantic City Electric Light Company of Atlantic City, N. J. The Ball Engine Company of Erie, Pa., will furnish engines for the Newark & Schuyler Electric Light Company of Newark, N. J. A large plant will be erected by the Ball Engine Company of Erie, Pa., to operate the Thomson & Houston system of arc lighting for the City Gas-Light Company of Norfolk, Va.

BALL ENGINE COMPANY,
ERIE, PA.,

NOTES.

A RECENT issue of the *Scientific American* contained an exhaustive description with numerous illustrations of the works and manner of construction of the Gorton Boiler, manufactured by the Gorton and Lidgerwood Company, which is now so popular for house heating purposes.

THE Chrome Steel Works, Brooklyn, N. Y., manufacturers of the celebrated Chrome Steel now used extensively throughout the country, warn bankers and others engaging in vault and safe work to insert in their contracts: "Chrome Steel and Iron 5-ply manufactured by the Chrome Steel Works of Brooklyn, N. Y.," and then call upon them to furnish a certificate stating that they have supplied the successful bidder for their work, with their material, as there are several cheap imitations of Chrome steel which safe makers and others are persuaded to buy, because they can buy them at a less price than the genuine Chrome Steel. These imitations are of course represented to be equal to the genuine article, which they are not, lacking like all counterfeits the peculiar and remarkable qualities of the genuine.

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IN THE
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Is superior to any other Portland Cement made. It is very finely ground, always uniform and reliable, and of such extraordinary strength that it will permit the addition of 25 per cent more sand, etc., than other well-known brands, and produce the most durable work. It is therefore the most economical to use. 8,000 barrels have been used in the foundations of the Statue of Liberty. Architects and those interested in Portland Cement will please send for my pamphlet, which will be mailed free on application. It contains valuable directions for the employment of Portland Cement, a table of results of the strength of the Dyckerhoff Cement when mixed with sand and broken stone in various proportions, together with tests and testimonials of eminent Engineers, Architects and Consumers.

E. THIELE, 78 William St., New York.
SOLE AGENT FOR THE UNITED STATES.

Something New for the Stable.

Read's Patent Harness Bracket.

An Article long wanted but never before made.
Holds the whole harness, takes no more room than the ordinary hook or peg, can be used for both single and double harness. Gives the harness-case a neat appearance, as it carries the harness up uniformly in width with the saddle, beside keeping the bridle and breastplate in their proper shape. They are neatly japanned, with gilt facings. Price $18 per dozen. Are now in use in over 100 first-class private stables in and about Boston.

Each bracket lettered "J. J. Read, Boston, Mass." For sale by dealers everywhere.

Indorsed and approved by the following named gentlemen, all of whom have them in use:

Boston: R. H. White, J. Montgomery Sears, J. T. Morse, Jr., Thos. Motley. South Boston: Benjamin Dean. Cambridge: F. A. Kennedy, John Bartlett, Chas. H. Gass. Portsmouth, N. H.: Hon. Frank Jones. Milton: Col. H. S. Russell, J. Malcolm Forbes. Dedham: A. W. Nickerson. Baltimore, Md: J. D. Mallory. Newton: J. C. Potter, C. E. Billings, A. R. Mitchell. Waltham: J. H. Ellison. Readville: C. G. White. Beverly: Dr. Chas. Haddock. Swampscott; C. P. Curtis. Boston, Mass.: Waldo Adams, with the Adams Express Co. Philadelphia, Pa.: Edward N. Williams, of the Baldwin Locomotive Works.

The public are cautioned against all similar brackets, not marked with my stamp, as such brackets are infringements of patents held by me.

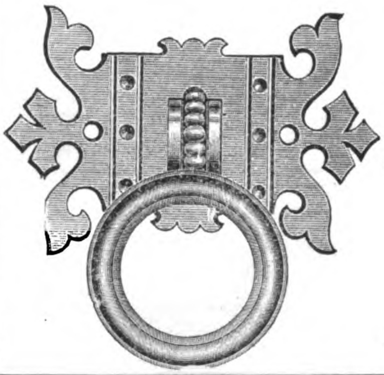
Also cedar-top riding-saddle bracket. Price $3.50 each. And whip-rack for English coach and straight whip combined. Price 50 cents each.

JAMES J. READ, 13 Tremont Row, Room 10.

ESTERBROOK'S STEEL PENS

FOR SALE BY ALL STATIONERS.
THE ESTERBROOK STEEL PEN CO.
20 John Street, New York, N. Y.

ANTIQUE
DRAWER AND CABINET
HANDLES



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J. B. SHANNON & SONS,
1020 Market Street,
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Write for Illustrated Catalogue.

PRESERVATIVE COATINGS.

FOR EXTERIOR USE.

SPAR COATING.
SPAR UNDERCOATING.

TRADE MARK.

FOR INTERIOR USE.

I. X. L. No. 1.
I. X. L. No. 2.
FLOOR FINISH.

Manufactured only by

EDWARD SMITH & CO., VARNISH MAKERS,
158 WILLIAM STREET, NEW YORK.

NIGHTINGALE'S
Flat, Concrete Fireproof Construction,
AS ADOPTED IN HUNDREDS OF
Works, Mills, Factories, Banks, Flats, Public Buildings, etc.

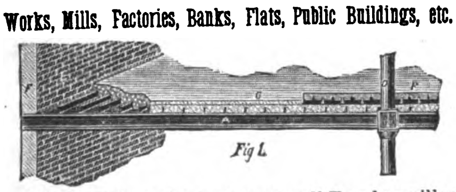


Fig. 1.

A is the main girder resting on wall E and on pillar D. B are the small iron joists resting on main girder A and on wall at other end. C the iron joists B bedded in concrete and forming both floor and flat ceiling. F shows a portion of the floor C laid with patent solid and noiseless Wood Block Tiles.

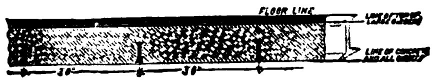
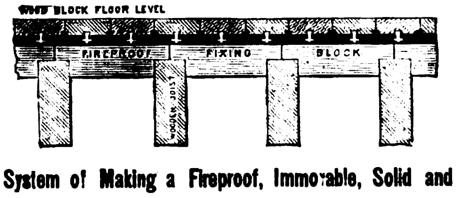


Fig. 2.

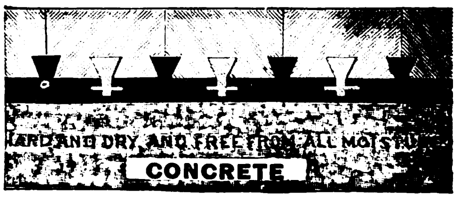
Section showing Flat Fireproof Construction where iron joists rest on bottom flange of main girder and in which all ironwork is entirely protected from fire.



System of Making a Fireproof, Immovable, Solid and Noiseless Floor over Wooden Beams.

without the aid of Deafening, Pugging, Beam linings, Mineral Wool, filling in of wet Concrete between the beams and like methods of an unsanitary and destructive nature usually adopted.

This forms a perfectly level and well bonded floor, strong and durable in all its parts. Indispensable to all who are and have been troubled and put to great expense by leaky floors. Perfectly Watertight. NO boarded floor required to be laid over Wooden Beams, FIREPROOF FIXING BLOCKS being used instead.



The best, cheapest, and most approved flooring possible for public and private buildings of every description. Wood blocks are dovetailed on under sides and ends to each other; and the underlying cement — after it has become quite hard and dry and free from all moisture, by means of a specially made antiseptic composition which forms a complete damp-course — prevents dry and wet rots and makes a thoroughly dry and warm floor. Forms one solid, compact mass, quite noiseless. No space underneath for rats, vermin, or dust to harbor. Air and water tight. Laid in various designs and in all kinds of woods. Very durable and lasting.

Over 5,000,000 feet laid in places where parquet tiles and marble are often laid, advantages being its NOISELESSNESS, SOLIDITY and WARMTH.

NIGHTINGALE FLOOR IMPROVEMENT CO.
151 Broadway, - - NEW YORK.

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THE AMERICAN ARCHITECT AND BUILDING NEWS

ADVERTISERS' TRADE SUPPLEMENT.

No. 74. SATURDAY, AUGUST 4, 1888. VOLUME XXIV. No. 658.

THE DURHAM SYSTEM OF HOUSE DRAINAGE.

The Durham System may be broadly described as a combination of scientific design, proper materials, and correct mechanical construction, — a common-sense application of obvious means to secure a result of vital importance.

The design of the work, the materials used, and the workmanship employed are an entire departure from the ordinary plumbing practice.

The result attained is a system of pipes which are independent of the building for support, which cannot be cracked or broken, and whose joints are permanently gas-tight beyond the shadow of a doubt.

Proper mechanical construction is the foundation of good drainage. The Durham System is a drainage apparatus constructed with wrought-iron (steam) pipe and heavy cast-iron fittings of special shapes, screwed together. This apparatus, when erected in a building, is steam-tight, elastic under pressure, and at all points absolutely invulnerable; it will last, unimpaired, as long as any building will stand — without any outlay for repairs.

Patented. — The Durham System is fully covered by patents. No patent could be obtained on the use of wrought-iron pipe, or screw joints, for drainage purpose; but the combination of wrought-iron pipe and special screwed fittings, which constitute a "new and improved" drainage apparatus, is patentable. The cost of the Durham System to the public, however, is no greater for the patents. They were secured for protection, and are not used for extortion.

MECHANICAL ADVANTAGES.

Joints. — The screw-threads on the pipes and in the fittings are cut by powerful machines, run by steam-power, to standard gauge, so that they exactly correspond. The threads are tapering, so that the further the pipe enters the fitting the tighter becomes the joint between the two. The threads are first covered with a thick paste of red-lead and oil and the pipe then screwed home by means of steam-fitters' chain tongs, by which a man can exert a powerful leverage. This work requires no skill — merely strength — and it is done in a moment. A laborer can make a tighter screw joint in one minute than a plumber with his materials could make in one hour.

Exposing Pipes. — Pipes should not be buried underground (within the building) nor hidden within the walls. It is a great satisfaction to be able at any time to examine drains and soil-pipes without the expense of tearing up. With the Durham System there is absolutely no objection to their being in plain sight everywhere; there are no joints between floor and ceiling; the pipes can be painted or bronzed, and do not betray their use or purpose in any manner. They simply look like steam-pipes, — which they actually are, — and the public have long been accustomed to the presence of steam-heating pipes. In the New York Cancer Hospital 3000 feet of our drainage pipes are in plain view, except where they pass through the floors. At the School of Mines, Columbia College, the store of Messrs. Brooks Brothers, 22d Street and Broadway, the De Vinne Press, and many other buildings, the Durham System is similarly arranged.

Smaller pipes can be used because of the absolute interior smoothness, — one inch in diameter less than is safe for plumbers' work. This effects a considerable saving. One 3-inch pipe serves two houses at Pullman.

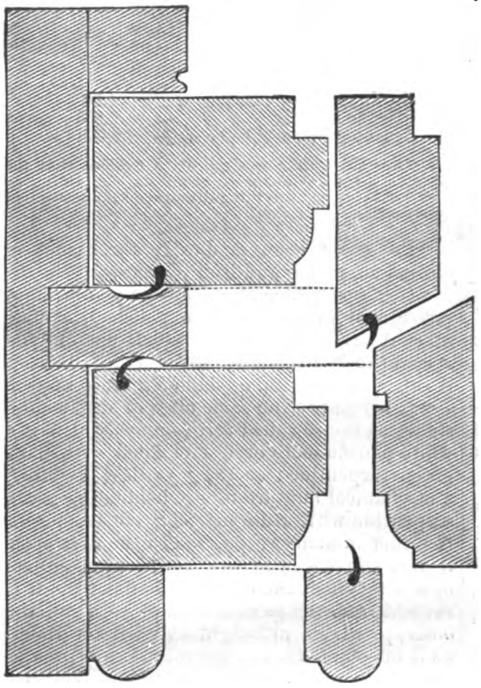
Changes and additions of fixtures are easily and skilfully made, at very small expense, without disturbing neighboring joints. We have inserted water-closet fittings in the middle of soil-pipe stacks, one hundred feet high, at a trifling expense.

Hand-holes, closed by screw plugs, are provided at every change of direction. The owner, with the aid of a wrench, can examine the interior condition of his drains, or remove an obstruction, without incurring a plumber's bill of expenses.

Tests can be made conveniently when the Durham System is finished, by screwing plugs into all openings and turning on steam, or filling the System with water to the tops of soil-pipes. No other than a pressure test of drainage is of any value.

DURHAM HOUSE DRAINAGE CO., OF NEW ENGLAND,
207 TREMONT ST., BOSTON, MASS.

THE EVERETT WEATHER-PROOF WINDOW.



To the unitiated the accompanying cut may seem unintelligible, but it represents a device of more than ordinary merit. The left-hand portion of the cut shows a section through a window exhibiting the two sashes, upper and lower, the parting-strip, a portion of the window-frame and the stops holding the sashes in place. By observing the cut it will be noticed the parting-strip is coved out on each side and a sort of overgrown comma will be noticed, with its head in the sash and tail in the cove. This comma is the gist of the whole invention, and represents a rubber-strip which is fastened in the sash, fitting a groove made to receive it and into which it is drawn, the blade represented by the tail of the comma extending out and forming to the cove in parting-strip from either sash a complete barrier to the passage of wind or dust, obviating the necessity of other weather-strips. The portion of the cut to the right is a section of the meeting-rails of the upper and lower sash, and the small rail at the bottom represents the stop-bead at the bottom of the window, the comma in each case being a rubber-strip, thus surrounding the window completely by a rubber-strip, and forming the most perfect weather-stripping imaginable. Architects would do well to look into this as it has been thoroughly tested and is now specified in most of the best houses being put up in New York City. It is a permanent fixture and does not disfigure the windows. The device is a very simple one and reflects credit on the ingenuity of the inventor; who is also the manufacturer. We might remark that this device is as readily applied to old work as new, but for further information we refer our readers for circulars and prices to,

G. W. EVERETT,
11 EAST TENTH STREET, NEW YORK, N. Y.

The Linoide Manufacturing Co., of Boston, has recently been established for the purpose

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TABLE OF COMPARISON BETWEEN COST OF COOKING BY COAL AND GAS.

The following Table of Comparison shows the result of a careful test made by the Goodwin Gas Stove and Meter Co., of Philadelphia, between articles cooked on a Peerless Range No. 8, and a No. 7 Sun Dial Gas Stove, giving their weight before and after cooking, and their cost:

RECORD OF PEERLESS COAL RANGE NO. 8.

ARTICLE.	How Cooked.	WEIGHT. Before Cooking.	WEIGHT. After Cooking.	Loss per cent.	Time.
Bluefish	Baked	3 lbs.	2 lbs. 1 oz.	32	31 m.
Rib of Beef	Roasted	9 lbs. 7 oz.	6 lbs. 8 oz	32	1 h. 37 m.
Chicken	Roasted	3 lbs	2 lbs. 2 oz.	30	1 h. 6 m.
Beef Steak	Broiled	1 lb. 2 oz.	13¼ oz.	25	11 m.
Lamb Chops	Broiled	1 lb. 1 oz.	11 oz	35	12 m.
Sweet Potatoes	Steamed	3 lbs. 5 oz.			
White Potatoes	Steamed	3 lbs. 8 oz.			
Cauliflowers	Boiled.	3 lbs. 12 oz.			
Tomatoes	Stewed	4 lbs.			
Bread	Baked		5 lbs. 2 oz.		46 m.
Sago Pudding	Baked		3 lbs. 5 oz.		27 m.
Lemon Pie	Baked		2 lbs. 12 oz.		30 m.

Sauces for Fish, Beef and Cauliflower.

RECORD OF NO. 7 GAS STOVE.

How Cooked.	WEIGHT. Before Cooking.	WEIGHT. After Cooking.	Loss per cent.	Time.
Baked	3 lbs	2 lbs. 6 oz.	20	35 m.
Roasted	9 lbs. 4 oz.	7 lbs. 11 oz.	17	1 h. 25 m.
Roasted	3 lbs. 1 oz.	2 lbs. 10 oz.	14	1 h.
Broiled	1 lb. 2 oz.	15 oz.	16¾	8 m.
Broiled	1 lb.	13½ oz.	15	10 m.
Steamed	3 lbs. 5 oz.			
Steamed	3 lbs. 8 oz.			
Stewed	4 lbs.			
Boiled	3 lbs. 12 oz.			
Baked		5 lbs. 7 oz.		37 m.
Baked		3 lbs. 3 oz.		28 m.
Baked		2 lbs. 14 oz.		22 m.

Sauces, etc.

Total time from lighting of fire until everything was ready to serve, 2 hours and forty minutes. Of this time 30 minutes were required to heat the oven, leaving 2 hours and 10 minutes actual cooking time. Weight of coal, including lighting of fire, 44 pounds. At the end of the time the fire was ready for more coal. Cost of coal, 44 pounds, at $6 per ton, 11.80 cents. Kindling, 1 cent. Total, 12.80 cents.

Total time from lighting of gas until everything was ready to serve, 1 hour and 50 minutes. Consumption of gas by test meter, 38 feet. At $1.50 per thousand feet cost, 5.70 cents.

Cost of coal .... 12.80 cents.
Cost of gas .... 5.70 cents.
Saving over coal .... 7.10 cents = 55½ per cent.

TABLE OF COMPARISON OF PERCENTAGES IN LOSS AFTER COOKING.

FISH.

GAS STOVE.		RANGE.	
Cost	35 c.	Cost	35 c.
Product	28½c.	Product	24¾c.
Loss	6½c.	Loss	10¼c.

Saving of Gas Stove over Range, 3¾ cents.

BEEF.

GAS STOVE.		RANGE.	
Cost	166½c.	Cost	169⅝c.
Product	138⅜c.	Product	117 c.
Loss	28⅛c.	Loss	52⅝c.

Saving of Gas Stove over Range, 24½ cents.

CHICKEN.

GAS STOVE.		RANGE.	
Cost	61½c.	Cost	60 c.
Product	52¾c.	Product	42½c.
Loss	8¾c.	Loss	17½c.

Saving of Gas Stove over Range, 8¾ cents.

STEAK.

GAS STOVE.		RANGE.	
Cost	24¾c.	Cost	24¾ c.
Product	20⅝c.	Product	18 9-16c.
Loss	4⅛c.	Loss	6 3-16c.

Saving of Gas Stove over Range, 2 1-16 cents.

CHOPS.

GAS STOVE.		RANGE.	
Cost	20 c.	Cost	21½c.
Product	16⅞c.	Product	13¾c.
Loss	3⅛c.	Loss	7¾c.

Saving of Gas Stove over Range, 4⅝ cents.

The total saving in the cost of food cooked over Coal Range .... 43 11-16 c.
Saving in cost of gas over coal (cost of coal over gas, 46 per cent.) .... 3 78-100c.
Total saving .... 47 46-100c.

of making an article called Linoide. With this they claim the application of one coat over paint on the exterior of houses, gives it a high, glassy, durable appearance which will last for years. It is equally applicable on faded work, restoring same to its former color.

MARYLAND SERPENTINE.

Maryland Serpentine or "Green Marble" as it is familiarly known to the trade, is found in the serpentine belt as it passes through Harford County, Maryland, and belongs to the class of metamorphic rocks; it is a hydrosilicate of magnesia, containing no lime whatever, with small percentages of oxides of chrome, nickel and iron which give it its varied shades of green color, and there are occasionally, small thin veins of dolomite passing through the mass. It takes a perfect arris and an extremely fine and brilliant polish; it does not weather, but retains its polish as well as granite; there have been severe tests made of this quality by exposing small polished pieces to the weather, and after a year's time there was no perceptible change in the polished surfaces, which after cleaning with water were as bright and fresh as when first put on, nor were the rubbed or rough surfaces changed in any way.

As an ornamental stone, for wherever a green color can be used, there is no superior now known, and it is particularly adapted for wainscoting, floor and wainscot tiling, mantel facings, ashlar work, columns, pilasters, pedestals, monumental work, etc. The peculiar, non-weathering qualities render it particularly suitable for out-door work or anywhere exposed to the action of water, or the atmospheric gases which usually are so destructive to marble work.

Professor Fred. A. Genth, of the University of Pennsylvania, after a personal examination of the quarries in Maryland, reports in substance as follows, viz.:

"It is a variety of massive serpentine, somewhat resembling Williamsite, and shows sometimes a slightly slatey structure. It occurs in various shades of green, from a pale, leek green to a deep blackish green, and from a small admixture of magnetic iron more or less clouded; rarely with thin veins of dolomite passing through the mass. It is translucent to semi-transparent. The analysis of a deep green variety, gave the following results:

Silicic Acid	40.06
Alumina	1.37
Chronic Acid	0.20
Niccolous Acid	0.71
Ferrous Acid	3.43
Manganous Acid	0.09
Magnesia	39.02
Water	12.10
Magnetic Iron	3.02
	100.00

Hardness	4.00
Specific Gravity	2.668
Crushing Strength[1] per sq. in.	32,000 lbs.

Note.—From this analysis it is evident that the stone is a hydro-silicate of magnesia, containing no *lime* whatever, nor anything to cause decomposition or 'weathering.'

"Its green color is due to the oxides of chromium, nickel and iron present.

"It is susceptible of a very fine and brilliant polish, and furnishes, when polished, a magnificent ornamental stone, which not only on account of its durability, but also of its beauty, is superior to anything similar that is known.

"It belongs to the same class of ornamental stones as the so-called *verde-antico*, which is a white marble more or less clouded with dark green serpentine; or the "verde-d' Egetto," a mechanical mixture of predominating green serpentine with white marble: but is superior to either in many respects. In the first place it will stand weathering better than either; how little effect the atmosphere has upon it is evident from the examination of rocks on the outcrop, which, although, exposed for thousands of years, are not weathered to a greater depth than about $\frac{1}{16}$ to $\frac{1}{8}$ of an inch and are quite fresh and green below. In a polished condition it appears to me to be practically almost unalterable, as the polished surfaces do not admit of the absorption of atmospheric agencies, which cause the decomposition."

Willard H. Morse, M. D., Consulting Chemist, of Plainfield, N. J., during the year 1887, at the special request of an architect made an analysis of this serpentine, with a view of ascertaining its non-weathering qualities, etc., and his report thereon is as follows:

"Laboratory Report No. 2849, Oct. 17, 1887.

"In the matter of a specimen of 'Precious Serpentine,' said to have been obtained in the County of Harford, Maryland, furnished by a client.

"The specimen is a green stone, beautifully mottled and clouded and susceptible of a ready and brilliant polish, permanent and regular in outline. It may be described as a Hydrosilicate of magnesia, $Si\,O_2\ 2\ H_2\,O.\ 3\ (Si\,O_2\ 2\ Mg\,O) + 2\ H_2\,O$. It is granular in character, inclining to compact, with a hardness of 3.85 and having a soapy feel. Under the microscope each grain is found to represent an imperfect crystalloid, irregular in boundary and being itself constituted of a number of twinned crystaline plates. In this intimacy of structure it is evidenced that it is unlike the *ordinary serpentine* which is used for building purposes. Dissolved in acid with difficulty, it leaves as a residuum a greenish powder represented in some degree by clino-rhombic prisms. Observed under conditions correspondent with the operation of atmospheric agencies, it undergoes no alteration. Decomposition is much more difficult than is the case with marble and is not accomplished without charging water or watery vapor at a high temperature with boric or hydro-fluoric acids. In fine my laboratory estimation is that it will not respond to agencies analogous to weathering."

(Signed) WILLARD H. MORSE, M. D.

This stone has been introduced upon the market within the last year or two and is received with great favor by the architects and builders and has been used for ornamentation to a considerable extent in a great many of the large public and private buildings which are now in course of erection or recently completed: a few of the most prominent are: New Public Buildings, Philadelphia, Pa.; Equitable Insurance Co.'s New Building, New York; Bullitt Building, Philadelphia, Pa.; Ponce de Leon Hotel, St. Augustine, Fla.; State, War and Navy Depts. Building, Washington, D. C.; Fletcher Building, Wichita, Kan.; Wilmington Savings Fund Society Building, Wilmington, Del.; James Everson's Russian and Turkish Bath Building, New York.

Besides a great many others and numerous private buildings and residences.

There is also a black variety of this serpentine which is fully equal to Glens Falls black, for tiling, bordering, base-courses, etc., and much more durable.

Particular attention is called to the fact that this is *not* the Chester Co., Pa., serpentine which is used for building purposes. The entire plant, quarries and lands in Harford Co., Md., have recently changed hands and the new owners have thoroughly repaired and enlarged the plant, putting in the most improved machinery for quarrying and working the stone

[1] By Tinius Olsen & Co., Philadelphia, Pa.

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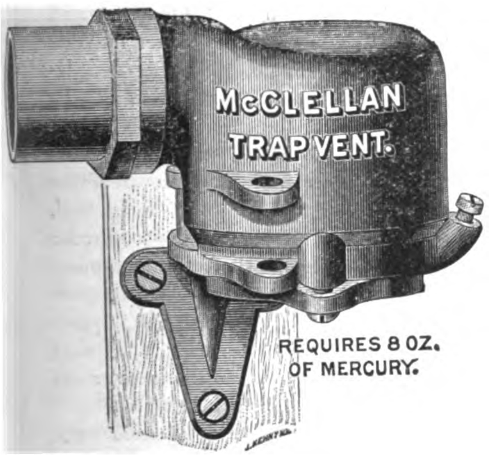
and are in a position to fill orders with promptness and despatch.

Those desiring further information, samples, prices, etc., should address,

THE SERPENTINE CO.,
9th AND MARKET STS., WILMINGTON, DELAWARE.

TRAP SIPHONAGE.

WE have before called attention to the McClellan Vent, of which we present a cut, showing it in a somewhat different form, suited for use where a side connection is needed, rather than the older form opening from below. In referring to this device, it may not be out of place to refer to the question of back-venting, and one of the advantages this vent offers as against the usual form of running a vent-pipe to the roof. Either one of these systems proposes accomplishing the same object, namely, supplying air to the sewer side of the trap, thus saving the seal of the trap by relieving it of atmospheric pressure which otherwise would cause its siphonage. And for accomplishing this purpose both are adequate under ordinary circumstances, but there are frequently cases where back-venting by pipe-connection fails of its purpose; as where the pipe is so situated that it is more difficult to move the column of air than to siphon the trap, in which case the trap must suffer, as in fact it frequently does; but this is not the only defect; this system of



back-venting tends to create a strong and constant current of air through the vent-pipe, which tends to evaporate the water in the trap. This is especially liable to happen in small traps or those not frequently used, such as the traps under wash-trays or basins in spare rooms, where this costly and intricate system of plumbing is liable to prove anything but effective as a security against sewer-gas. In other words, this system does too much; it does not stop its work when it has prevented siphonage, but by evaporation as effectively breaks the seal; especially is this true in winter, when the air outside the dwelling is wrung to the utmost degree of dryness by the cold, and upon entering the warmer pipes of the house finds its power of absorption immediately raised and attacks the water-seal in every trap with the utmost avidity. No better proof of this can be given than the fact that in very cold weather the top of the pipe opening on the roof is frequently closed by the moisture frozen there. This defect is not found in this vent, for immediately upon the flow of waste water stopping, the vent closes and the passage of air stops, and there is no steady current creating constant evaporation, and besides, the air passing into the pipes by this vent is the warmer air of the building not the cold, dry outside air, and the tendency is rather to precipitate moisture in the pipes than to cause evaporation. We have in former reference called attention to experiments made to test this appliance, but enough has been said to show the advantage of this system of back airing over the system usually adopted, to say nothing of the large expense involved in the complicated systems in general use. If we were to prophesy regarding future plumbing systems, we should say they would tend in the future towards greater simplicity, and the present complicated systems now in use and frequently enforced by law will come to be regarded as the outgrowth of a period of mechanical lunacy.

DU BOIS MFG. CO.,
NEW YORK, N. Y.

MORTAR STAINS.

THE pleasing effects attainable by the use of Mortar Stains has led to their wide-spread adoption by the architects and builders, especially in the beautiful suburban towns adjacent to large cities, where the demand for them is steadily upon the increase. The character of the coloring matter used is of course an important consideration, and as results are not always immediately manifest, too much care cannot be exercised in their selection. Competitive tests of the different brands all point to the "Pecora Mortar Stain" as the most desirable, especially in the thoroughness of its coloring qualities, permanency and absolute imperviousness to atmospheric changes. Neither heat, cold or dampness will cause it to run or bleach and in no respect does it alter the condition of the mortar, quicken the set or induce it to crumble. No more haste therefore is necessary in striking the joints than with ordinary white. Careful analysis also proves its freedom from all substances injurious to the workman and likewise demonstrates the absence of gas, oil and all impurities which tend to hinder the process of hardening. It is incapable of change and therefore cannot possibly increase the white deposit common to brick fronts, and being reduced to a smooth paste it assimilates readily with the mortar, while we have the testimony of competent experts that a given quantity of this stain will color one-third more mortar than any in use, so that, all points considered, "Pecora Mortar Stains" are by long odds the most effective and economical of all.

S. BOWEN'S SONS,
150 NORTH 4th ST., PHILADELPHIA, PA.

THE PRINCIPLE OF THE SANITAS WATER-CLOSET.[1]

THE requisites for a water-closet are, (1) simplicity, (2) quickness and thoroughness of flushing, (3) freedom from all unscoured parts, (4) economy in construction and water consumption, (5) compactness and convenience of form, (6) amplitude of standing water in the bowl, (7) accessibility and visibility of all parts, including trap, (8) smoothness of material, (9) strength and durability of construction, (10) facility and reliability in jointing, (11) security against evaporation and siphonage, (12) ease and convenience of flushing, (13) noiselessness in operation, and (14) neatness of appearance.

The pan-closet must be discarded, because it violates every one of the above requirements.

The valve and plunger closets must be discarded, because they violate all but the sixth and twelfth requirements.

The ordinary so-called long and short hoppers are to be rejected, because they violate the second, third, fourth, sixth, tenth, eleventh, and thirteenth requirements. There is no standing water in their bowls to receive and deodorize the soil, so that they are constantly fouled. A preliminary flush is sometimes arranged to partially obviate this trouble, but this contrivance is not to be relied upon. The method of connecting the common hopper with the soil-pipe is usually defective, the seal is too shallow to withstand even a slight evaporation and siphonage, and they are exceedingly noisy in operation.

All closets which depend upon a double trap violate rules 1, 4, 7, 11, and 13. Should anything get lodged in the lower trap, it is generally impossible to get it out without taking the entire apparatus down; and when the lower trap is formed in a single piece of earthenware with the rest of the closet, an obstruction therein could not in some cases, be removed without breaking the closet open.

The side-outlet, or so-called *wash-out* type of closets, have a shallow bowl flushed by a strong stream of water, which is intended to drive the waste matters out of the bowl into a shallow trap underneath; they violate rules, 1, 2, 3, 4, 7, 11, 12, and 13.

The flushing is usually attended with spattering. The standing water in the bowl is not sufficiently deep, and the manner of flushing is noisy and ineffective, the lighter wastes frequently whirling round and round for some time before being driven out. The trap is inconvenient of access, and its seal is very shallow, and easily broken by siphonage, evaporation, or incorrect setting, and being out of sight, the evil may not be discovered until the damage is done. The pipe surface between the basin and the pipe is easily fouled and difficult to clean.

[2] In the effort to obtain a water-closet which should fulfil all of the above-mentioned requirements, the writer has made use of a principle of hydraulics new in the practice of plumbing, namely, that of supporting a water-column by atmospheric pressure acting only at its lower end. The principle is explained by the simple laboratory experiment of the inverted bottle in the basin of water (Fig. 33).

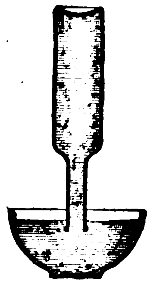


Fig. 33.—Inverted Bottle.

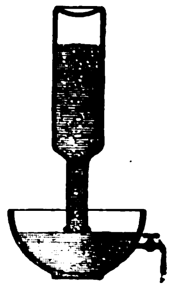


Fig. 34.—Water exhausted from the bowl.

If an ordinary bottle be filled with water and inverted in such a manner that its mouth shall be immersed below the surface of water in a basin below, the water in the bottle will be supported by atmospheric pressure acting on the surface of that in the basin. Let now this surface by lowered by any cause, and we shall find that it will be instantly restored from the bottle as soon as it sinks below its mouth, as shown in Fig. 34.

We have applied this principle to water-closet construction in the manner illustrated in Fig. 35. The water-closet represents our basin, and its supply-pipe our inverted bottle, which is closed at its top by the cistern-valve. If water is exhausted from the closet bowl by evaporation, siphonage, or any other cause, a

[1] Wood's "*Reference Handbook of the Medical Sciences.*" Article on "Habitations: The General Principles of House Plumbing."

[2] From "*Improved Plumbing Appliances,*" by J. Pickering Putnam. Published by William T. Comstock, New York, 1887.

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fresh supply descends automatically from the pipe as soon as the surface sinks below its mouth. Inasmuch as in the construction of the closet, this mouth is placed above the bottom of the water-seal, it is evident that water will instantly descend from the pipe before the seal can be broken. This seal is four inches deep, and the mouth of the pipe is midway between the top and bottom of the seal, or, in other words, two inches below the normal level of the standing water in the bowl.

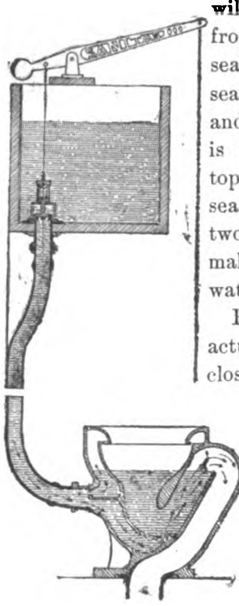
Fig. 35.—Diagram illustrating the Principle of the Sanitas Water-closet.

Fig. 36 represents the actual construction of the closet.

The action of the apparatus is as follows:

The cistern-valve being raised, the balance of atmospheric pressure is restored, the water-column in the pipe instantly begins to move, and, since it connects with the water in the closet below its level, it acts noiselessly and effects a thorough flushing.

A novelty in the general principle of construction involves corresponding novelties in many details.

The lower end of the supply-pipe is not simply opened at a single point below the water level, but is conducted to two places independent of each other, the first being intermediate between the overflow of the trap and the bottom of the seal, as is shown in Fig. 35, and the second at the bottom of the trap. The first forms the mouth proper of the "inverted bottle" and supplies water to the flushing-rim, and the second furnishes a jet which lifts part of the water out of the trap and bowl by its propelling power. Since both jets enter below the level of a large body of standing water in the bowl, their noise is deadened, and, as the supply-pipe always stands full, they act instantly, and the flushing of the closet is very rapid. The lower jet causes the water and waste matters in the closet to sink into the neck of the bowl. Meanwhile, the upper jet fills the passages and annular chamber leading to and surrounding the flushing-rim, overflows, and descending into the neck of the bowl, falls upon and drives out the waste matters collected in the neck quietly and without waste of water.

The cistern-valve being again closed, movement in the supply-pipe immediately ceases, and the water in the flushing-rim and passages leading thereto, falls back into the closet and restores the normal level of the standing water in the bowl and trap.

The form of the closet bowl is shown in plan in Fig. 37. The standing water has the shape best calculated to receive and deodorize the waste matters falling into it. It is deepest at the back of the closet, and very deep at the point where the wastes strike. Its surface is long and comparatively narrow, and is not round or elliptical, as has heretofore been customary. The reason for this is simple, and will easily be understood upon reflection. We know that the user of a closet will sometimes sit forward, and sometimes back on the seat, according to circumstances, but it rarely, if ever, happens that he will sit laterally out of centre, inasmuch as this would be extremely awkward and uncomfortable. Hence the water surface should have considerable longitudinal extension, while much less lateral extension is required; and we have found that the narrower the water surface within certain limits, the more easily, quickly, and economically in respect to water consumption will the waste matters be expelled. By examining Fig. 36 it will be observed that the under surface of the bowl is horizontal from front to rear, except at the outlet, and that this surface is immersed under an inch or so of water. It will also be observed that the water-slots in the flushing-rim are largest in the front and rear, and gradually diminish as they extend round to the sides. The result of this comformation is that the upper flushing water jumps on top of the waste matters and acts to the best possible advantage in driving them quickly out, and the closet can be easily flushed in three seconds by less than a gallon and a half of water.

A stream of water may be rendered noiseless, however rapid and powerful its movement, by properly directing it into a body of water larger than itself, provided the point of entrance be below the surface. It is not sufficient to do this in the manner usual in the old form of English and French siphon-jet closets, because the jet in these at once throws the standing water out of its way, and then makes an uproar even more appalling than the ordinary flushing stream. In these "siphon-jet" closets, the water used for cleansing the upper part of the bowl, when used in combination with the jet in the trap, is not only insufficient to keep the lower jet covered, but makes a most disagreeable clamor of itself, after the usual manner with modern closets.

The upper flushing stream should furnish a body of water nicely calculated to keep the lower stream just covered, and should itself be noiseless. The former result is easily attained by simply adjusting the size of the upper and lower flushing openings with reference to each other; the latter by constructing a special chamber into which the upper flushing stream may be projected before it enters the bowl.

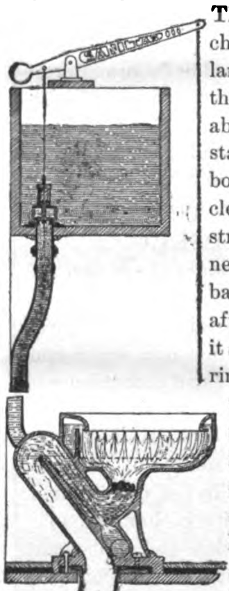
Fig. 36.—Actual Section of the Sanitas Water-closet.

The upper part of this chamber forms an annular ring and surrounds the flushing-rim. Being above the level of the standing water in the bowl, it receives only clean water. Being constructed in such a manner as to drain itself back into the closet bowl after each flushing action, it stands, like the flushing-rim proper, empty at all times excepting during the moment of flushing. The upper jet discharges into the standing water in the lower part of this chamber, and its sound is instantly and entirely deadened. The water rises in the annular chamber and overflows through the flushing-rim to descend quietly into the bowl, lubricate its sides, and assist the lower stream in ejecting the wastes and flushing the closet and drain-pipes.

In order to make a perfectly and permanently tight soil-pipe connection, metal plates, or shoes, are used. These shoes are cast to exactly fit the porcelain base. The shoe has a four and one-half inch hole in it, corresponding with the outlet hole in the water-closet. The lead pipe which is to connect the closet with the iron soil-pipe is to be first flanged over the four and one-half inch hole in the shoe at the floor, and the closet is then set in place on the shoe and screwed down by means of four brass machine-screws which are furnished with each closet. The holes in the earthenware base correspond with the threaded holes tapped in the shoe. A mixture of red lead and putty is used between the earthenware base and the metallic shoe, and when this hardens the whole becomes, as it were one piece, and the closet is thus independent of shrinkage or settling of the floors. All movement takes place in the flexible lead-pipe below, which should always be used between a closet and the rigid iron soil-pipe. The joint thus becomes a permanently sewer-gas tight metallic joint which cannot be injured by jarring, settlement, or shrinkage in the building.

It will be observed, by referring to the perspective drawing, that the closet is provided with a cistern overflow connection at the flushing rim. The same pipe may serve also as a ventilating pipe. By connecting this with a proper ventilating flue above the cistern, in the manner shown in the drawing, Fig. 38 (on p. 44), the seat and bowl of the closet may be ventilated. Such ventilation is serviceable at the moment of usage of the closet, but it is not needed for the bowl and trap themselves, which are kept odorless by their construction and arrangements for flushing. It is well, however, always to ventilate toilet-rooms, for the purpose of removing the vapor and gases generated during their use by the occupant and by the gas burning, and as good a place as any to locate the ventilating outlet is under the seat of the water-closet in the manner described.

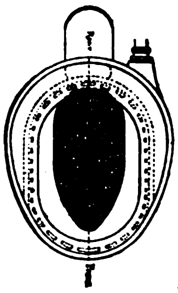
Fig. 37.—Plan of Closet.

Let us now examine our table of desiderata, and see in how far this closet conforms to the various items.

1. Simplicity. We find here the simplest form possible with closets. The trap and the bowl are one and the same thing. Each forms half of the other. The flushing is accomplished by the pressure of the water only, and without machinery of any kind in the closet. We have, in fact, the simplicity of the short hopper, which is the simplest form of water-closet known.

2. Quickness and thoroughness of flushing. The maximum of rapidity of flushing is attained by having the supply-pipe always full of water, so that the action at the lower end takes place simultaneously with the lifting of the valve, and all delay and loss of power occasioned by the water falling from the cistern through the pipe and against the resistance of the enclosed air is avoided. The combined action of the two lower jets of water is, moreover, as already described, such as to accomplish the removal of the waste matters with the utmost speed, in virtue of their coöperation.

The *thoroughness* of the flushing or cleansing action, with a given quantity of water, is evidently in direct proportion to the rapidity and direction of the action, it being assumed that the surfaces to be flushed are properly constructed to receive it, as is the case with the closet under consideration. The form and volume of the standing water in the bowl is such as to protect the sides from being fouled

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by adhesive matters. The solid and heavy wastes, which are the adhesive ones, cannot fall against these sides. If liquid or semi-liquid matters are projected against them they will not stick. Therefore these sides require not so much great *force* as a *uniform distribution* of the flushing water. The parts which require scouring force are those below and beyond, including the trap and the main soil and drain pipes, and it is these parts which in this closet receive it. The scouring action on the pipes is here equal to that of the plunger-closet, while it is free from the siphoning action on fixtures below of the latter; for air freely follows the discharge and prevents the formation of a vacuum.

3. Freedom from all unscoured parts. The closet contains no cesspool in its construction, and has the minimum extent of surface, interior and exterior, possible in a water-closet.

4. Economy in construction and water consumption. Being constructed of a single piece of earthenware of compact and simple form, this desideratum is met. The consumption of water is reduced to a minimum, in the manner already explained. No loss of power is sustained in the supply-pipe, and each drop in the closet acts in the most effective manner, in concert with the rest, to produce a rapid and thorough flush.

5. Compactness and convenience of form. The closet occupies the minimum of space, as may be seen from the perspective drawing. The outlet is under the centre, which facilitates its setting.

6. Amplitude of standing water in the bowl. The standing water has the proper form and depth, and its surface is calculated to stand at the most desirable distance below the seat of the closet. It will be seen, upon reflection and experiment, and in testing different forms of water-closets, that the nearer the seat the surface of the standing water can be brought, the less liability there will be for spattering when the soil falls into it. In fact, if the surface could be brought so near that the soil would actually touch it before falling, there would be no spattering at all. But, of course, it should not stand so near as to come in contact with the person. The distance established as the best, all things considered, is five inches below the top of the flushing rim, and this distance has been adopted in the case of the Sanitas closet.

7. Accessibility and visibility of all parts, including the trap. A study of the drawings will show that this desideratum has been attained. The closet and trap, as well as its supply-pipe and cistern, may easily be emptied by a sponge or ladle when the house is closed during the winter.

8. Smoothness of material. The closet being constructed of glazed earthenware in a single piece, and everywhere with easy bends, this requirement is fully answered.

9. Strength and durability of construction. The compact and simple form of the closet, the central position of the base under the bowl giving it equal and firm support, and the soundness and reliability of its soil-pipe connection, give it the greatest strength and durability possible with water-closets.

10. Facility and reliability of jointing. There is but a single, simple, and strong brass coupling connection to be made with the supply, and a single connection with the waste-pipe. The small coupling at the flushing-rim for a seat-vent and cistern over-flow may be used or closed up, as desired.

11. Security against evaporation and siphonage. The new principle of supply already described, together with the unusual depth of the water-seal, render this closet practically secure against loss of seal through evaporation and siphonage.

12. Ease and convenience of flushing. It is only necessary to pull the valve-chain and immediately release it again to obtain a sufficient, and no more than sufficient, flush. The trap and bowl refill themselves automatically after the flush. The valve may also be operated by a simple seat or door attachment, if desired.

13. Noiselessness in operation. This very important desideratum has been much neglected in modern water-closet construction. It has hitherto been assumed that it would be impossible to combine noiseless action with a powerful and rapid water scour. Nevertheless, this has been accomplished in our Sanitas closet in the manner already described; and the closet may be used in becoming secrecy, as is agreeable to civilized people, and without the usual "flourish of trumpets," which so ridiculously proclaims the fact to the household whenever any one has sought a moment of special privacy.

14. Neatness of appearance. Now that the wise custom of setting all the plumbing fixtures open is becoming every day more general, it is important that every fixture should be so designed as to present an agreeable and appropriate appearance. By this we not only save the expense of panelled woodwork, but secure better workmanship and healthier houses.

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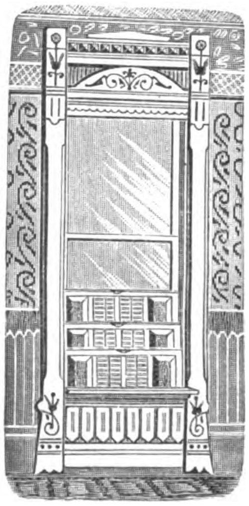
NOTES.

THE sales of Babcock & Wilcox boilers for May and June, 1888, are as follows: Edison Electric Illuminating Co., Paterson, N. J.. 250 horse-power; Planters' Sugar Refinery Co., New Orleans, La., 240 horse-power; Girard Estate, Philadelphia, Pa., fourth order, 51 horse-power; C. Bruin & Co., Milan, Italy, 10 horse-power; David Colville & Sons, Motherwell, near Glasgow, Scotland, third order, 700 horse-power; Mineral Railroad & Mining Co., Wilkes-Barre, Pa., second order, 240 horse-power; McWhirter, Ferguson & Co., Glasgow, Scotland, second order, 51 horse-power; The Platt-Lane M'f'g Co., Ltd., Hindley, England, 124 horse-power; Bureau Provisions and Clothing, Washington, D. C., second order, 1040 horse-power; Imperial Continental Gas Ass'n, for Vienna Opera-House, Vienna, Austria, second order, 248 horse-power; Mrs. R. S. Welham, Homestead Plantation, St. James Parish, La., second order, 156 horse-power; L. Stern & Co., Ltd., London, England, fourth order, 130 horse-power; Edison Phonograph Works, Orange, N. J., 146 horse-power; American Glucose Co., Buffalo, N. Y., second order for Peoria, 960 horse-power; Phœnix Horse Shoe Co., Poughkeepsie, N. Y., 146 horse-power; Eagle Paper Co., Franklin Ohio, second order, 122 horse-power; W. M. Foster, Melbourne, Australia, second order, 45 horse-power; Montreil & Co., Petit-Quevilly, France, 82 horse-power; Florida Sugar M'f'g. Co., St. Cloud, Florida, second order, 240 horse-power; Oneco M'f'g. Co., New London, Conn., 208 horse-power; Ferdinand Bracq, Ghent, Belgium, 105 horse-power; The House-to-House Elec. Lt. Supply Co., L'd, Kensington, Eng., 468 horse-power; Irene Brun & Co., St. Chamond, France, 92 horse-power; Westinghouse Air Brake Co., Allegheny, Pa., second order, 92 horse-power; Edison Electric Ill'g Co., New Orleans, La., 312 horse-power; Solvay Process Co., Syracuse, N. Y., sixth order, 416 horse-power; James Leslis Wonklyn, Doré Hotel, Bournemouth, England, 65 horse-power; American Glucose Co., Buffalo, N. Y., tenth order, 208 horse-power; Dodge M'f'g. Co., Mishawaka, Ind., 272 horse-power; Department of the Interior, Washington, D. C., 122 horse-power; Marshall Bros., & Co., Philadelphia, Pa., 272 horse-power; Societa Italiana Generale di Elettricita, Sistema Edison, Milan, Italy, sixth order, 479 horse-power; Societa Italiana Generale di Elettricita, Sistema Edison, seventh order for Royal Italian Naval Arsenal, Spezia, Italy, 186 horse-power; Lehigh Coal & Navigation Co., Philadelphia, Pa., fourth order, 832 horse-power; Westmoreland Paper Co., West Newton, Pa., second order, 480 horse-power.



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Perhaps the most exhaustive tests that could be applied to Portland Cement were made on "Black Cross" which was selected by the Library Commission after reports made by General Meigs and Lieut.-Col. Peter C. Hains recommending it for the concrete foundations of the Congressional Library Building, Washington, D. C., as the most suitable for the work after other brands had been condemned.

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To those interested in this subject a pamphlet under the caption "Some Information on Portland Cement" will be sent on application to Howard Fleming, 23 Liberty Street, New York.

The Chalmers Spence Company of New York, whose Asbestos goods, more particularly their removable pipe and boiler coverings, are well known throughout the United States, removed their Philadelphia office, July 16th from 32–34 South 2d Street to 24 Strawberry Street, where their representative will be pleased to show their Asbestos specialties and explain their merits to all interested parties.

The Whittier Machine Company are putting into the Sherman House, Boston, a new hydraulic passenger elevator operated by their pressure tank system. They are also putting into the building No. 19 Kilby Street, occupied by Mr. J. C. Paige, a new hydraulic passenger elevator operated by their pressure tank system.

BUILDING INTELLIGENCE.

Reported for the American Architect and Building News.

ALTERATIONS.

Philadelphia, Pa. — *Sixtieth St.*, s e cor. Market St., shed addition to feed-store; owner, Jacob Zell, Fernwood, Del. Co.

Frankford Ave., w s, bet. Green and Rann Sts., front to stone building; owner, Walter Scott, 4244 Frankford Ave.

Fourth St., e s, bet. Oxford St. and Columbia Ave., one-st'y front building and interior alterations; owner, William Tuklenburg, 1614 Cadwalader St.

Twenty-second St., s e cor. Trinity Pl., French roof on dwell.; owners, Stacy, Reeves & Sons, 1611 Filbert St.

Leiper St., No. 4408, two-st'y addition; owner, James Blakely.

South Tenth St., No. 758, addition to back building and bay window; owner, Chas. T. Brown, 755 Florida St.

Ingersoll St., No. 2403, brick front; owner, Joseph Doyle, 3918 Pine St.

Newmarket St., n w cor. Wood St., three-st'y addition; owner, C. Joos, 504 Vine St.

South Thirteenth St., No. 103, rear, two-st'y addition; owner, Thomas A. Lynch, 1619 North Fifteenth St.

Cresson St., e s, bet. Grape and Cotton Sts., one-st'y addition; owner, John Steinler, Manayunk Ave., near Shur's La.

HOUSES.

New York, N. Y.—*Union Ave.*, w s, 75′ e Ritter Pl., two-st'y brick and frame dwell., tin roof; cost, $3,800; owner, Mary A. Connolly, 2712 Third Ave.; architects, Arctander & Meyer, 528 Willis Ave.

One Hundred and Fifty-ninth St., n s, 175′ e Boulevard, 10 three-st'y brick dwells., tin roofs; cost, $55,000; owner, Mary E. Carlin, One Hundred and Forty-third St. and Eighth Ave.; builder, John Carlin, One Hundred and Forty-third St. and Eighth Ave.

Forty-seventh St., n s, 175′ e Lexington Ave., 6 three-st'y brick dwells., tin roofs; cost, $84,000; owner, Angelo Mondofo, 116 East Fifty-ninth St.; architects, Schneider & Herter, 48 Bible House.

Eighty-fourth St., n s, 450′ w Eleventh Ave., three-st'y brick dwell., tin roof; cost, $18,000; owner, Mathias Murray, 152 West Eighty-third St.; architect, John M. Dunn, 1193 Broadway.

Sedgwick Ave., e s, 150′ n One Hundred and Eighty-fourth St., two-st'y brick and frame dwell., peak and shingle roof; cost, $8,500; owner, John W. Hutchinson, 353 West One Hundred and Twenty-third St.; builders, Coöperative Building Plan Association, 63 Broadway.

West End Ave., s w cor. Eighty-sixth St., 10 four-st'y brick dwells., mansard, tin and slate roofs; cost, $180,000; owner, Jacob Lawson, Brooklyn, N. Y.; architect, Jas. H. Taft, 146 Broadway.

West End Ave., s e cor. Eighty-fifth St., 5 four-st'y brick dwells., mansard, tin and slate roofs; cost, $100,000; owner, James B. Gunn, 1710 Tenth Ave.; architect, Jas. H. Taft, 146 Broadway.

Palisade Ave., s e, abt. 300′ s Spaulding La., three-st'y frame and brick dwell.; cost, $20,000; owner, Percy Pyne, 25 East Twenty-second St.; architects, Renwick, Aspinwall & Russell, 71 Broadway.

Washington Ave., e s, 68′ n One Hundred and Sixty-eighth St., two-st'y brick and frame dwell., tin roof; cost, $5,500; owner, John Mauser, 1315 Washington Ave.; architect, Adolph Pfeiffer, 2773 Third Ave.

Percy R. Pine, brick and stone dwell.; architects, Renwick, Aspinwall & Russell.

Philadelphia, Pa. — *Federal St.*, s s, w Twenty-fourth St., 15 two-st'y dwells.; contractor, George S. Spelt, 1621 Hicks St.

Amber St., w s, bet. Huntingdon St. and Lehigh Ave., three-st'y dwell.; contractor, D. C. Schuler, 2327 North Sixth St.

Ninth St., w s, bet. Berks St. and Montgomery Ave., 3 two-st'y dwells.; contractor, John K. Brinkworth, 2152 East Dauphin St.

North Third St., No. 908, three-st'y dwell.; builders, C. F. Wells & Sons, 4080 Spring Garden St.

Fairmount Ave., s s, bet. Forty-sixth and Markoe Sts., 14 three-st'y dwells.; owner, James J. Loughery, n e cor. Forty-first and Haverford Ave.

Mill Grove Ave., n w s, bet. Germantown Ave. and Thirtieth St., 2 two-st'y dwells.; builder, Ashton S. Tourison, 5541 Germantown Ave.

Howard St., e s, bet. Diamond St. and Susquehanna Ave., three-st'y dwell.; contractor, Chas. E. Myers, 2426 North Sixth St.

Hope St., w s, bet. Diamond St. and Susquehanna Ave., 2 two-st'y dwells.; contractor, same as last.

Sixty-third-and-a-half St., e s, bet. Arch and Race Sts., 2 two-st'y dwells.; builder, William Douglas, 330 North Sixty-third St.

Sixth St., w s, bet. Huntingdon St. and Lehigh Ave., three-st'y dwell.; contractor, Henry G. Schultz, 2633 Germantown Ave.

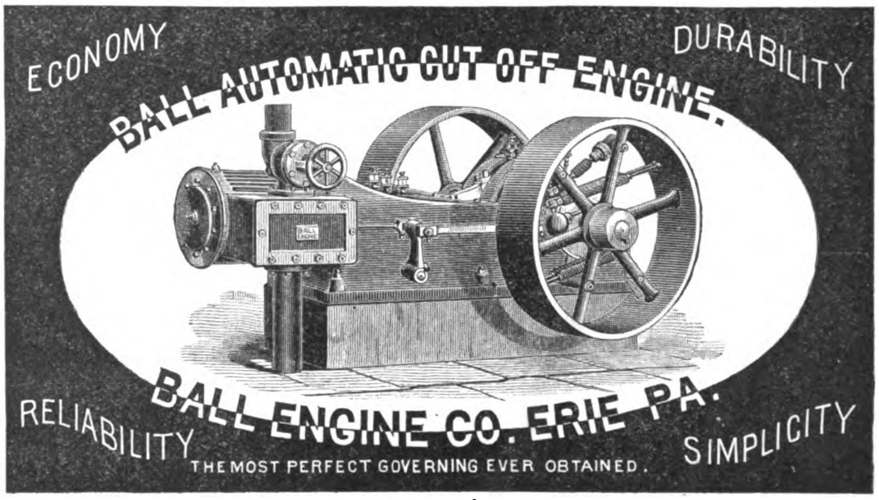
Dounton St., n s, bet. Juniata and Howard Sts., 5 two-st'y dwells.; owner, James Mole, 1707 Dounton St.

Mather St., n s, bet. Sixteenth and Seventeenth Sts., two-st'y dwell.; owner, same as last.

Twenty-third St., e s, bet. Ellsworth and Federal Sts., 11 three-st'y dwells.; contractor, Henry R. Coulomb, 731 South Tenth St

Broad St., e s, bet. Tasker and Morris Sts., three-st'y dwell.; owner, E. R. Cassady, 842 Wharton St.

Twenty-sixth St., bet. Fletcher and Dauphin Sts., 2 three-st'y dwells.; contractor, E. P. Hall, 2317 North Thirteenth St.



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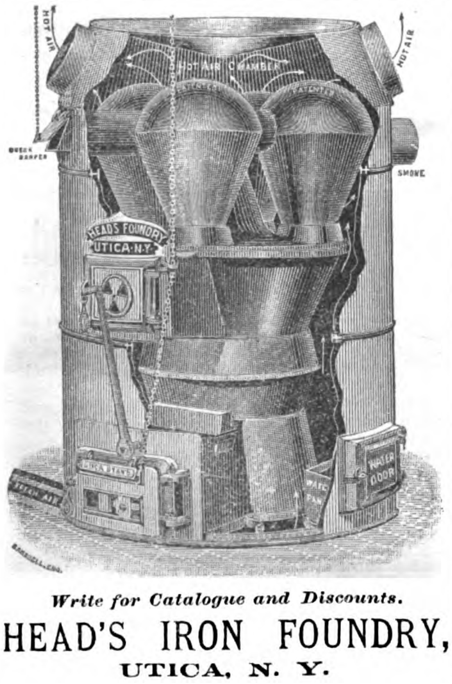

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Thirty-third St., e s, bet. Spring Garden and Rockland Sts., 6 three-st'y dwells., 2 with stores; contractor, Hartman Grau, 652 Preston St.

Bet. Cayuga St. and Germantown Ave., 10 four-st'y dwells.; contractor, James Mole, 1707 Dounton St.

Emily St., bet. Fourth and Fifth Sts., 18 two-st'y dwells.; contractor, William J. Ross, 2025 Oakford St.

Mercy St., n s, bet. Fourth and Fifth Sts., 11 two-st'y dwells.; contractor, Michael J. Cassidy, 1102 Camilla St.

Ellsworth St., No. 919, seven-roomed dwell.; owner, William MacRae Bryant, 915 Spruce St.

Third St., e s, bet. Dauphin and York Sts., 11 three-st'y dwells.; contractor, John S. Serrill, 1413 North Broad St.

Dauphin St., n s, e Third St., 3 three-st'y dwells.; contractor, same as last.

J. J. Deery, architect, 328 Walnut St., has prepared plans for a three-st'y brick dwell. to be built cor. Chestnut and Thirty-eighth Sts., for Pedro Galam; cost, about $15,000; no contracts let.

P. A. Welsh, architect, 429 Walnut St., has prepared plans for a stone dwell., with all modern conveniences, at Chestnut Hill, for H. F. McCann; no contracts let.

J. F. Stuckert, architect, 524 Walnut St., has prepared plans for 100 dwells. to be built on Twenty-seventh St. and Lehigh Ave., for Thomas Waters; cost, each, about $3,000.

Willis G. Hale, architect, 919 Chestnut St., has prepared plans for three-st'y stone dwell., with all conveniences, to be built cor. Walnut Lane and Wayne Ave., for Col. William M. Gregg; cost, about $30,000.

James H. Windrim, architect, 132 South Third St., has prepared plans for 2 four-st'y brick and brownstone dwells., to be built cor. Green and Twenty-second St., for William H. Temble; cost, about $50,000; to be built by day work.

James H. Windrim, architect, 132 South Third St., has prepared plans for a brick and stone dwell., with tile roof and and modern conveniences, to be built at Chestnut Hill, for Jacob S. Disston; cost, about $30,000; contract to be let shortly.

Wilson Eyre, Jr., and W. E. Jackson, architects, are working on a dwell. to be built on Graves Lane, Chestnut Hill; cost, about $12,000; no contracts let.

Wilson Eyre, Jr., and W. E. Jackson, architects, have removed to their new offices, 927 Chestnut St.

Somerset St., s s, bet. Park Ave. and Thirteenth St., 14 two-st'y brick dwells.; contractor, Thos. H. Flood, 2747 Frankford Ave.

Fifty-second St., w s, bet. Master and Thompson Sts., three-st'y brick dwell.; builder, William H. Jones, cor. Fifty-third St. and Wyalusing Ave.

Morris St., n s, bet. Broad and Rosewood Sts., 3 three-st'y brick dwells.; owner, George Lodge, 1200 South Third St.

Jarrett St., s s, w Twenty-second St., 10 two-st'y brick dwells.; owners, R. & A. Wilson, 1711 South Twentieth St.

Media St., s s, e Sixty-first St., 4 two-st'y brick dwells.; builder, Lewis W. Goodman, 3602 Sansom St.

Providence, R. I.—*Chester Ave.*, frame dwell.; cost, $2,800; owner, W. J. Meany; builder, J. H. Canning.

Langley St., n, frame dwell.; cost, $2,400; owner, P. Connely; builder, J. H. Canning.

Dudley St., cor. Tanner St., 2 frame dwells.; cost, $4,000; owner, E. G. Burrows, Jr.; builder, B. A. Mason.

Coville St., e, frame dwell.; cost, $2,500; owner, Katharine Gray; builders, Watts Bros.

Eagle St., w, 2 frame dwells.; owner, J. McKenna.

Fairmount St., dwell.; cost, $1,400; owner, Catharine Paisley; builders, Sweet & Winsor.

Atwell's Ave., frame dwell.; cost, $1,500; owner, H. Manning.

Brook St., e, frame dwell.; owner, S. M. Nicholson; architects, Gould & Angell; builder, H. Goff.

Messer St., frame dwell.; cost, $2,600; owners, Harris & Perry.

Wickendon St., frame dwell.; cost, $3,000; owner, E. Walsh; builder, T. W. Barry.

Anthony St., frame dwell.; cost, $2,500; owner, T. Grimes; architect, E. I. Nickerson; builder, J. Weeden.

Washington, D. C.—*Connecticut Ave.*, two-and-a-half-st'y frame dwell.; cost, about $7,000; owner, G. G. Presbrey; contracts not let.

West Philadelphia, Pa.—F. K. & W. R. Price, 731 Walnut St., have prepared plans for a dwell. to be built at cor. of Thirty-third and Arch Sts., for Mrs. J. Graham; cost, about $9,000; contracts not let.

STABLES.

New York, N. Y.—*Railroad Ave.*, e s, 91′ 3″ n One Hundred and Thirty-eighth St., two-st'y brick stable, tin roof; cost, $15,000; owner, American Express Co., 65 Broadway; architect, Edward H. Kendall, 1 Broadway.

West Thirty-sixth St., No. 556, three-st'y brick stable, tin roof; cost, $12,000; owners, Rohe & Bro., 266 West Thirty-third St.; architects, Thom & Wilson, 1267 Broadway.

Philadelphia, Pa.—*Buist Ave.*, bet. Sixty-first and Sixty-second Sts., frame stable; contractor, Joseph Lewis, 6214 Buist Ave.

Romulo Vasquez, Holmesburg, Philadelphia, is making drawings of stable for Titus Brothers of that place.

Broad St., e s, bet. Tasker and Morris Sts., two-st'y stable; contractor, E. R. Cassady, 842 Wharton St.

Twenty-sixth St., e s, bet. Fletcher and Dauphin Sts., stable; contractor, L. P. Hall, 2317 North Thirteenth St.

STORES.

Brooklyn, N. Y.—*Stuyvesant Ave.*, s e cor. Halsey St., three-st'y brownstone store and dwell., tin roof; cost, $8,000; owners and builders, Lambert & Mason; architect, I. D. Reynolds.

Fourth Ave., w s, 65′ s Twenty-sixth St., 4 three-st'y brick stores and tenements, tin roofs; cost, each, $5,400; owner, M. Dalton, Twenty-sixth St., bet. Third and Fourth Aves.

Bedford Ave., n e cor. Guernsey St., two-st'y frame store and loft, gravel roof; cost, $3,000; owners and builders, Randall & Miller, 16 Bedford Ave.

Reid Ave., w s, 25′ s Pulaski St., 2 four-st'y brick stores and flats, tin roofs; total cost, $18,000; owner, E. A. Post, 745 Van Buren St.; architect, H. Vollweiler; contractor, S. W. Post.

Prospect St., n e cor. Hamburg Ave., three-st'y frame (brick-filled) store and dwell., tin roof; cost, $3,500; owner and builder, P. Thawer, Flushing and Hamburg Aves.; architect, Th. Engelhardt.

Detroit, Mich.—Peter Dupont & Co., frame store 434 Croghan St.; cost, $7,500.

A. E. French, 3 two-st'y stores, Nos. 101-105 Michigan Ave.; cost, $9,200.

Peter Dedericks, Jr., two-st'y brick store, 386 St. Aubin Ave.; cost, $5,000.

John P. Schmitt, two-st'y brick store, Gratiot Ave.; cost, $4,000.

Jos. Wolf, two-st'y frame store, Michigan Ave. and Twenty-sixth St.; cost, $2,000.

New York, N. Y.—*East Forty-second St., Nos.* 148-150, five-st'y brick store, gravel roof; cost, $16,000; owner, James Renwick, 71 Broadway; architects, Renwick, Aspinwall & Russell, 71 Broadway.

Third Ave., No. 2590, one-st'y frame store; cost, $3,000; owner, Mary C. Steele, 2592 Third Ave.; architects, Arctander & Meyer, 528 Willis Ave.

One Hundred and Twenty-fourth St., n s, 100′ w Third Ave., two-st'y brick store, gravel roof; cost, $20,000; owner, Edward Rothschild, 230 East One Hundred and Twenty-fourth St.; architects, Buchman & Deisler, 8 West Twenty-ninth St.

Philadelphia, Pa.—Angus S. Wade, architect, 20 South Broad St., is working on plans for a store on Lancaster Ave., near Preston St., to be of pressed-brick, with English redstone trimmings; cost, about $20,000.

Chestnut St., n s, bet. Fifth and Sixth Sts., four-st'y fireproof store and office-building; contractors, Samuel Hart & Sons, 1184 Wallace St.

Cumberland St., n e and n w cors. Sartain St., 3 stores, and 1 store, s e cor. Huntingdon and Sartain Sts.; owner, John Loughran, 2544 North Eighth St.

Twenty-third St., e s, bet. Ellsworth and Federal Sts., 2 stores; contractor, Henry R. Coulomb, 731 South Tenth St.

Frankford Ave., No. 3107, three-st'y store; owner, Frank N. Forsyth, 2125 Jefferson St.

Third St., e s, bet. Dauphin and York Sts., store; owner, John S. Serrill, 1413 North Broad St.

Thirty-third St., cor. Spring Garden St., and *Thirty-third St.*, cor. Rockland St., 2 stores; owner, Hartman Grau, 655 Preston St.

MISCELLANEOUS.

Boston, Mass.—*Warren Ave.*, near Front St., Ward 5, two-st'y freight-building, flat roof, 30′ x 350′; owner, Fitchburg R. R. Co.; builder, E. K. Turner.

Condor St., cor. Brooks St., Ward 1, one-st'y brick pumping-station, 47′ x 55′; owner, City of Boston; builders, Donahue Bros.

Cincinnati, O.—Schmidt & Bro., two-st'y ice-works, McMicken St.; cost, $4,000; architect, John Ball.

Philadelphia, Pa.—*Christian St., No.* 2041, two-st'y building; builder, W. B. Chapman, Twelfth St., bet. Christian and Carpenter Sts.

John Ord, architect, 31 South Fifteenth St., is making drawings for a large green-house, with dome at end, to be built at Villa Nova P. R. R., for Mr. Garrett; heated by hot water; cost, $15,000.

PROPOSALS.

July 31, 1888. Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock P. M. on the 15th day of August, 1888, for the labor and materials required in the erection and completion of the additional basement and area walls, including excavation and concrete foundation for same for the Post-Office, Court-House, etc., building at Wichita, Kans., in accordance with the specification and drawings, copies of which may be seen at this office; the office of the Superintendent; Builders' Exchange, Cincinnati, O.; Builders' and Traders' Exchanges, Denver, Col., Kansas City, Mo., and Chicago, Ill.; N. W. Permanent Exhibit, Minneapolis, Minn., and the Superintendent of the Old Custom-House, St. Louis, Mo. Each bid must be accompanied by a certified check for $200. Upon receipt at this office of a post-office money order in amount two dollars ($2.00), drawn to the order of the Treasurer of the United States, parties will be furnished with copies of the drawings and specification. WILL. A. FRERET, Supervising Architect. 658

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THE CELEBRATED SOLID WHITE CROCKERY STATIONARY WASH-TUBS.
The only Perfect Sanitary Tubs now in Existence.
VERY STRONG.
No seams to open. Absolute cleanliness secured for all time.
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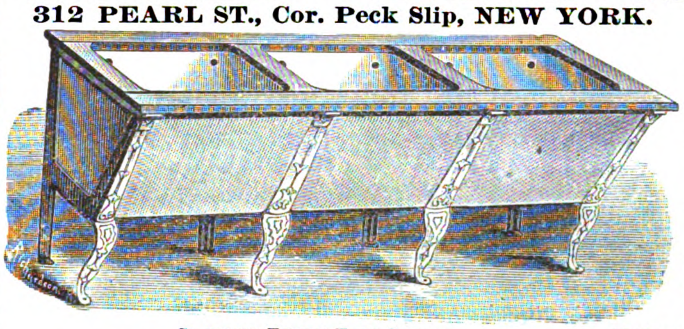

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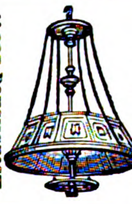

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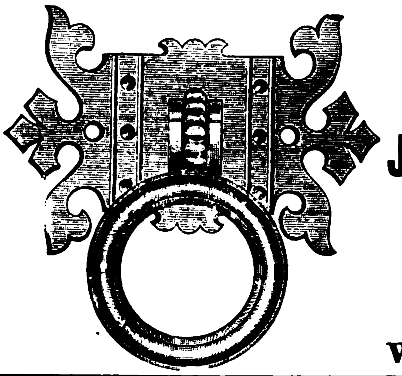

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An Article long wanted but never before made.

Holds the whole harness, takes no more room than the ordinary hook or peg, can be used for both single and double harness. Gives the harness-case a neat appearance, as it carries the harness up uniformly in width with the saddle, beside keeping the bridle and breastplate in their proper shape. They are neatly japanned, with gilt facings. Price $18 per dozen. Are now in use in over 100 first-class private stables in and about Boston.

Each bracket lettered "J. J. Read, Boston, Mass." For sale by dealers everywhere.

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Flat, Concrete Fireproof Construction,

AS AD PIED IN HUNDREDS OF

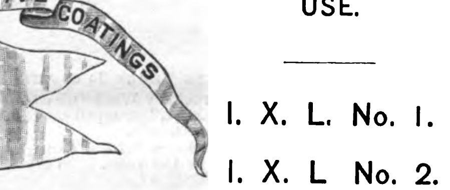
Works, Mills, Factories, Banks, Flats, Public Buildings, etc.

Fig 1.

A is the main girder resting on wall E and on pillar D. B are the small iron joists resting on main girder A and on wall at other end. C the iron joists B bedded in concrete and forming both floor and flat ceiling. F shows a portion of the floor C laid with patent solid and noiseless Wood Block Tiles.

Fig. 2.

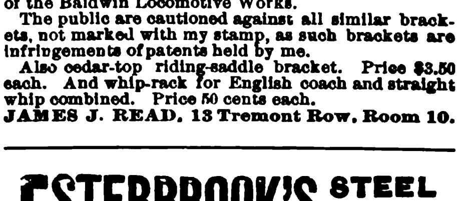
Section showing Flat Fireproof Construction where iron joists reston bottom flange of main girder and in which all ironwork is entirely protected from fire.



System of Making a Fireproof, Immo able, Solid and No'seless Floor ovar Wooden Beams.

without the aid of Deafening, Pugging, Beam linings, Mineral Wool, filling in of wet Concrete between the beams and like methods of an unsanitary and destructive nature usually adopted.

This forms a perfectly level and well bonded floor, strong and durable in all its parts. Indispensable to all who are and have been troubled and put to great expense by leaky floors. Perfectly Watertight. NO boarded floor required to be laid over Wooden Beams, FIREPROOF FIXING BLOCKS being used instead.



The best, cheapest, and most approved flooring possible for public and private buildings of every description. Wood blocks are dovetailed on under sides and ends to each other; and the underlying cement — after it has become quite hard and dry and free from all moisture, by means of a specially made antiseptic composition which forms a complete damp-course — prevents dry and wet rots and makes a thoroughly dry and warm floor. Forms one solid, compact mass, quite noiseless. No space underneath for rats, vermin, or dust to harbor. Air and water tight. Laid in various designs and in all kinds of woods. Very durable and lasting.

Over 5,000,000 feet laid in places where parquet tiles and marble are often laid, advantages being its NOISELESSNESS, SOLIDITY and WARMTH.

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THE AMERICAN ARCHITECT AND BUILDING NEWS

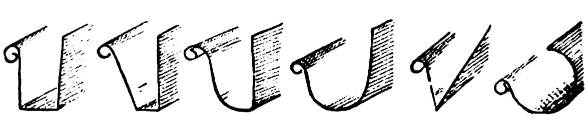
ADVERTISERS' TRADE SUPPLEMENT.

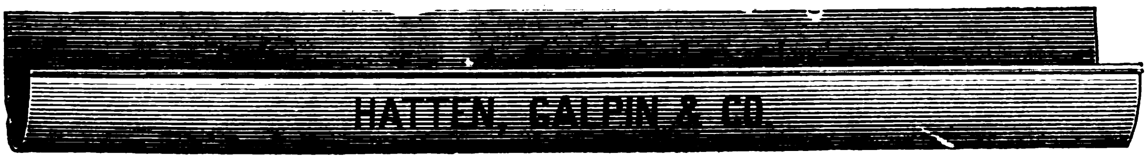
No. 75. SATURDAY, SEPTEMBER 1, 1888. VOLUME XXIV. No. 662.

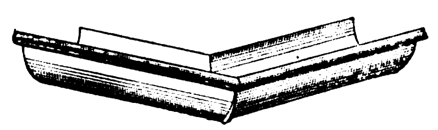
IMPROVED EAVES TROUGH, GUTTER AND ANGLES.

WE introduce here cuts of what have proved to be great labor-saving devices for the tinner, and which are rapidly growing in popularity. The merit of these articles lies not alone in the fact of their being time and labor saving, but is in a large measure due to the excellent quality of materials used, the superior workmanship bestowed upon them, and the facts of their being nicer in appearance, more durable and far less likely to become leaky than troughs and gutters made in the old way. The manufacturers, Hatten, Galpin & Co., Binghamton, N. Y., are greatly encouraged by the favor which these goods are meeting, particularly in the West through Chicago jobbers. They say that if this trade continues to increase, as it has lately been doing, Chicago will "take the belt."

The question is often asked, which is best for eaves trough and gutter, terne or tinplate? This firm say on this point: "From experience and numerous tests, we are satisfied that terne is much superior to tin for such cases. While ternes cost less, they are worth at least twenty-five per cent more than tin for troughs and gutters. The tough, heavily leaded IX ternes that we use for our eight-foot seamless troughs will, with proper care, remain good as long as any other part of the building."







The longest of the cuts shown on this page represents the eight-foot seamless eaves trough made by this house. It is made half round in sizes from four to ten inches, IX and IXX terne, IX bright tin, B.B. galvanized-iron, and sixteen-ounce brazier's copper. The other long cut presents a side view of eight-foot wide gutter. It is made of 14, 17, 20, 24 and 28 inch terne, tin, copper and galvanized iron. Another cut will be recognized as representing end views of wide gutters. Special designs of trough and gutters are made to order. Among the special advantages claimed for these goods by the manufacturers are these: "The metal used in our troughs and gutters is the best grade to be obtained in America and Europe; our IX and IXX terne plates are coated by the old process on 'Martin-Seimens' soft sheets; these troughs will last four times longer than short length IC troughs; they are straighter, stiffer, stronger, and improve the looks of the building; they save the labor and solder of six joints in every sixteen feet; 500 feet can be made and put up quicker than 100 feet of short troughs."

Something new for the benefit of tinners is shown in the cuts of the new patent angles or mitres for eave-trough corners made by machinery. The manufactureres say that since the advent of ready-made stove-pipe elbows there has been nothing produced in the tinners'-supply line that will be more welcome than these ready-made angles. A special feature is the patent rib pressed in one piece at the mitre joint, to stiffen and strengthen them. They are cut and formed by machinery, and are put upon perfect forms when soldered, so they are correct angles. They are made with either inside or outside bead in all ordinary sizes, and of all grades of IC and IX tin and terne, galvanized-iron and copper. We have seen samples of these mitres in terne plates and in galvanized-iron, and they are certainly admirable in every respect. They are perfect in form, accurate, very strong, and pleasing to the eye. Hatten, Galpin & Co., make them in all sizes and all kinds of metals. They will be supplied direct or through jobbers.

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NOTES.

THE Whittier Machine Company are putting in one of their double-screw freight elevators for Messrs Abram French & Co., of Boston. Also, they are constructing for the Piedmont Manufacturing Company of Piedmont, S. C., six steel boilers, each 5½ feet in diameter, and one two ton freight elevator; and for the Victor Cotton Mills, Charlotte, N. C., three steel boilers and one freight elevator.

"GILBERTSON'S Old Method" Roofing Tin has been specified by the Architect of the new B. & O. Depot, at the foot of Smithfield Street. One thing certain, the coming generation are sure of a good roof from rain and storm while waiting for trains at the B. & O. — *The Builders' Gazette, Pittsburgh, Pa.*, Aug. 15, 1888.

BUILDING INTELLIGENCE.

Reported for the American Architect and Building News.

ALTERATIONS.

Chicago, Ill.—J. M. Gambell, alterations, Halsted St.; cost, $5,000; architect, C. P. Thomas.

L. Silverman, three-st'y front addition, Dearborn Ave.; cost, $5,000; architects, Adler & Sullivan.

APARTMENT-HOUSES.

Chicago, Ill.—H. Brown, 2 three-st'y flats, Monroe St.; cost, $8,500; architect, C. H. McAfee.

C. Gaengle, 2 two-st'y flats, West Polk St.; cost, $5,000; architect, L. Wichman.

J. Shepard, two-st'y flats, West Fourteenth St.; cost, $3,000; architect, F. La Point.

W. W. Henderson, 2 three-st'y flats, West Lake St.; cost, $14,000; architect, J. J. Kohn.

F. Karasek, two-st'y flats, West Twelfth St.; cost, $3,000; architect, J. Chavenik.

M. Kosak, two-st'y flats, Wall St.; cost, $3,000; architect, J. Krevanik.

G. Bischoff, two-st'y flats, Cleaver St.; cost, $3,-$500; architect, F. Miller.

M. H. Carstens, two-st'y flats, West Fourteenth St.; cost, $5,000; architect, P. T. Werges.

E. S. Wendel, four-st'y flats, Blue Island Ave.; cost, $9,500; architects, Schaub & Berlin.

J. M. Gamble, 2 three-st'y flats, West Lake St.; cost, $40,000; architect, C. R. Thomas.

M. Lanfeaski, three-st'y flats, West Fourteenth St.; cost, $3,800; architect, J. F. Deptulski.

A. Amandson, three-st'y store and flats, West Erie St.; cost, $7,000; architects, Lutken & Thisslen.

J. Gotnliewski, two-st'y flats, Crittenden St.; cost, $3,500; architect, M. Tukowski.

N. Koch, three-st'y flats, La Salle Ave.; cost, $7,-500; architect, J. Zittel.

T. Cmolik, three-st'y flats, West Seventeenth St.; cost, $4,000; architect, F. Sager.

S. Hanson, two-st'y flats, West Ohio St.; cost, $3,-000; architect, C. R. Rosmusson.

FACTORIES.

Boston, Mass.—*Kemble St.*, near Gerard St., Ward 20, two-st'y brick factory, flat roof, 124' x 188'; owners, Pearson Cordage Co.; builders, Webster, Dixon & Co.

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Chicago, Ill.—A. Harris, four-st'y factory, Jefferson St.; cost, $10,000; architect, J. Frank.

P. J. Hurther, two-st'y factory, Weld St.; cost, $15,000; architect, J. Zittle.

RAILROAD BUILDINGS.

Boothroyn, Pa.—Frame station; cost, $2,500; owners, B. & O. R R.; also several other small stations and large shops for the same Co. which will be built as soon as possible; architect, A. H. Bieler, Baltimore, Md.

Woodstock, Va.—Stone station, slate roof; cost, $4,000; owners, B. & O. R. R.; architect, A. H. Bieler, Baltimore, Md.

WAREHOUSES.

St. Louis, Mo.—Three-st'y brick warehouse; cost, $7,000; owner, Dr. J. H. McLean; architects, Kirchner & Kirchner; sub-let.

MISCELLANEOUS.

Baltimore, Md.—G. W. Gail & Ax are to have built a three-st'y brick warehouse, n s Lee St., bet. Charles and Light Sts.

Two and-one-half-st'y frame infirmary building for McDonogh Institute, Bath Co.; cost, $5,000; architect, A. H. Bieler.

Boston, Mass.—*Spring St.*, Ward 23, one-st'y frame waiting-shed, 6' x 64'; owners and builders, Old Colony Rd.

Park St., Ward 23, frame waiting-shed, 6' x 64'.

La Grange St., Ward 23, frame waiting-shed, 6' x 64'.

South St., Ward 23, frame waiting-shed, 6' x 64'.

Annawan St., Ward 23, frame waiting-shed, 6' x 64'—all for Old Colony Rd.

Medford St., *No.* 425, rear, Ward 4, one-st'y brick kiln, 38' x 7..'; owners, Philadelphia & Boston Fire Brick Co.; builders, Gooch & Pray.

Braintree St., Ward 25, one-st'y brick power station, flat roof, 36' x 90' 6"; owners, West End R. R. Corporation; builders, H. M. Leach & Co.

Brooklyn, N. Y.—*Bedford Ave.*, e s, 50' South Eighth St., four-st'y brick store-building, tin roof; cost, $8,000; owner, Wm. S. Liptrott, on premises; architect, E. F. Gaylor; masons, W. & T. Lamb, Jr.; contractors, Jno. Rueger.

Twenty-third St., pier foot of, two-st'y frame storage, board roof; cost, $3,000; owner, Wm. M. Tebo, on premises; architect and builder, D. E. Harris.

Philadelphia, Pa.—*Paul St.*, n Meadow St., two-st'y foundry; builders, R. C. Winnals & Bro., 4633 Worth St.

Thirtieth St., bet. Thomas and Master Sts., three-st'y mill; builders, R. C. Winnals & Bro., 4633 Worth St.

Darby Rd. and Fifty-ninth St., three-st'y brick and stone infirmary; contractors, Foot & McLaughlin, 317 Cook St.

Wharton St., bet. Eleventh and Twelfth Sts., two-st'y hall; contractor, Matthew Schmidt, 217 Walnut St.

Columbia Ave., cor. Broad St., Columbia Ave. saving fund; contractor, P. H. Somerset, 1513 North Twelfth St.

Reed St., s s, bet. Meadow St. and Delaware Ave., eight-st'y filter-house; contractor, Allen B. Rorke, 423 Walnut St.

St. Louis, Mo.—Two-st'y brick club-house; cost, $7,000; owner, R. Norris; builder, H. E. Roach.

PROPOSALS.

Proposals for dredging. United States Engineer Office, Mobile, Ala., August 27, 1888. Sealed proposals for dredging in Mobile Harbor, Ala., will be received at this office until 12 M., on Saturday, the 15th day of September, 1888, and opened immediately thereafter in presence of bidders. Specifications, general instructions to bidders and blank forms of proposal will be furnished on application to this office. A. N. DAMRELL, Major of Engineers, U. S. A. 663

SKY-LIGHTS, GREENHOUSES, ETC.

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U. S. Gov. Navy Yard, Washington,	15,000	sq. ft.
Grand Central Station, New York,	18,000	"
Bethlehem Iron Co., Bethlehem, Pa.,	13,500	"
Edge Moor Iron Co., Edge Moor, Del.,	14,000	"
Pencoyd Iron Works, Pencoyd, Pa.,	12,000	"
Allison M'f'g Co., Philadelphia, Pa.,	13,000	"
Cincinnati Union Depot,	18,000	"
New Capitol, Albany.	9,000	"
Met. Museum of Art, New York,	15,000	"

Museum of Fine Arts, Boston; Dickson M'f'g Co., Scranton, Pa.; Yale & Towne M'f'g Co., Stamford, Conn.; Cleveland Union Depot, Ohio; Poole & Hunt, Baltimore, Md., etc., etc. **Send for Illustrated Catalogue.**

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writes "*I use it almost daily for reference and regard it as a model*" He is referring to the Political Cyclopædia of which the Atlanta Constitution says, *It is doubtful, indeed, if a more important work of reference has ever been prepared*" and the New York Nation adds, "*The Cyclopædia is a timely and valuable aid to political education. We cannot withold our warm commendation of the industry and discrimination of the editor, and the enterprise of the publishers.*" Its articles are written by the most eminent specialists in this country and Europe. David A. Wells discusses the *Tariff* and *Tariff Legislation* from the standpoint of the free trader, and D. H. Mason from the point of view of the protectionist. E. L. Godkin writes of *Office Holders*; Prof. Alexander Johnston, the articles on the *Political History of the U. S.*; Dorman B. Eaton, of *Civil Service Reform*; Pres. D. C. Gilman of *Universities*; Simon Sterne, of *Railroads*; Pres. F. A. Walker, of *Wages*; Edw. Atkinson, of *Banks*; John J. Knox, of the *Currency*, etc. If you wish to know more about this work send to the publishers for their descriptive pamphlet which they will mail to you without charge. They want *good* Agents.

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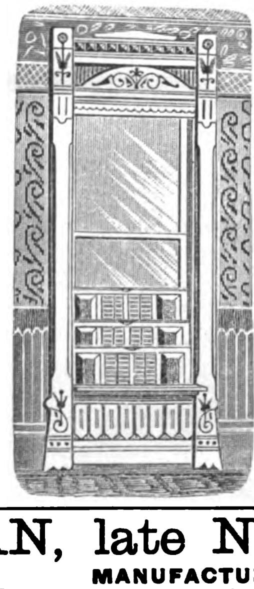

Hartman's Patent Inside Sliding Blind.

A great improvement over all other blinds, slide up and down in the window like sash, move easily, and stay where placed. No hinges, hence no swinging, sagging and tangling with curtains and window drapery. Must be *seen* to be appreciated. Excel *any other sliding blind* in the market for *economy, durability, style, beauty, convenience, etc.* Also the most perfect arrangement for Fly Screens, consisting of an additional section which slides same as the blinds; very much admired by all.

They are also made to slide entirely down to the floor, into pocket, out of sight, without any additional expense. 25 per cent. cheaper than the hinged blind, and *will last double the length of time.*

No more an experiment; tens of thousands now in use. Architects are specifying them. They always give satisfaction.

The only blind that is furnished with an *Automatic Burglar-Proof Lock, free of charge.*

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THE AMERICAN ARCHITECT AND BUILDING NEWS

ADVERTISERS' TRADE SUPPLEMENT.

No. 76. SATURDAY, OCTOBER 6, 1888. VOLUME XXIV. No. 667.

CABOT'S "ANTI-PYRE."

THIS is the first and only protection against fire that is cheap. It is the only liquid fireproofing we know of that is not dissipated by prolonged heat. Wood treated with this, if exposed to direct flames, will slowly char and emit inflammable gas at the point attacked if the flame is very hot, but the fire cannot spread, and entirely ceases as soon as the heat is removed. It is the only fireproofing that can be applied with a whitewash-brush by any boy. It is an excellent protection against colds and draughts, and can easily be applied so as to fill the cracks between boards, thus answering the purpose of plaster. An excellent fireproof substitute for back-plastering, if heavily applied. "Anti-pyre" prevents all danger of fire from sparks, hot coals, explosions from any cause, and spontaneous combustion. It can be used on all woodwork which needs protection from fire, and is not exposed to the direct action of rain. If used on outside work, a coat of linseed oil or of paint should be used over it. It is a complete substitute for tinning, and entirely avoids the two objections to that fireproofing: first, the expense; second, the possibility of the fire getting behind the tin, and doing its damage where it is almost impossible to get at it.

Of course, no fireproofing of this nature renders the combustion of the wood impossible, but it does make it so difficult that there is no danger of the fire spreading, even when there is unusual exposure.

We may mention that we have sold many thousand pounds to the Calumet and Hecla Mining Company, since their last fire, for the protection of the timbers used in the mine.

Among the places where it can be used to a special advantage are the following: —

Interior walls of chemical-works, gas-works, boiler-houses, rubber-works, saw-mills, tanners' and curriers' shops, varnish-factories, oil-distilleries. All places where naphtha and benzine are used. Oil-cloth factories. Around house-furnaces, furnace and steam pipes, chimneys, paint and oil stores, paint-shops, picker-houses, flour-mills, storehouses, laundries, etc.

It can be had in almost any color desired.

In estimating for a given surface, it is safe to say that one gallon will cover fifty square feet, two coats heavily applied, on rough wood; if used on smooth wood, one gallon will cover about one hundred and fifty square feet, two coats.

It is put up, ready for use, in one and five and ten gallon pails, fifteen and twenty gallon kegs, twenty-five and thirty gallon half-barrels, and in barrels containing forty to fifty gallons.

For samples on wood and further information, address,

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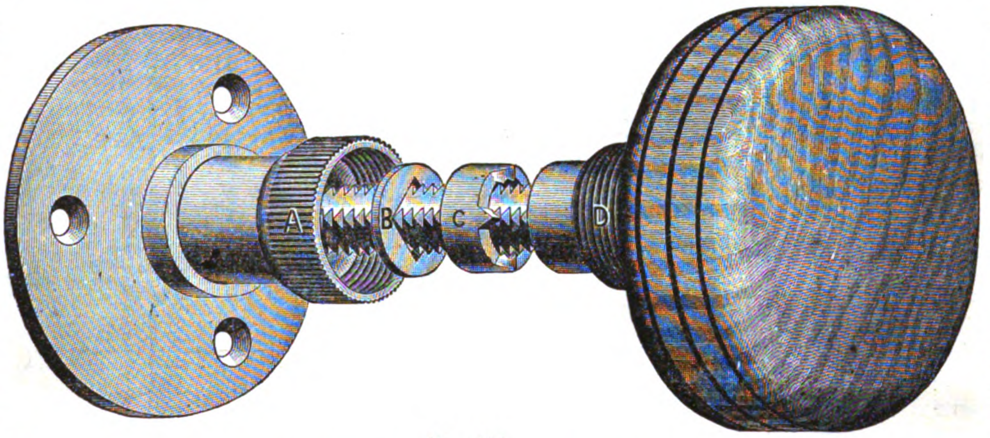

No. 301.

DESCRIPTION. — This fastening dispenses with the side screw, which has a tendency to shake loose and drop out. The shank **A** is hollow, and has a shoulder at its inner end. **C** is a nut which is screwed on the spindle to the inner end of the shank, pushing the washer **B** before it. The knob has a square aperture in its shank **D**, slides on the spindle, and the shank **A** is screwed upon **D**, drawing the knob up to its place. These knobs are quickly and easily applied, and give a perfect adjustment to the thickness of the door.

SCREWLESS-FASTENING KNOBS.

THERE has long been a desire on the part of architects and others for a door-knob which would dispense with the ordinary side screw, that is, the screw which holds the knob to the spindle and which unless nicely fitted has a tendency to shake loose and drop out, permitting the knob to come off in the hand, which as all know who have had the experience is a great annoyance. The illustration shows a recently patented method of overcoming this imperfection. In applying these knobs the roses are first screwed to the door, the spindle on which one knob is already fastened is passed through the door, the hollow shank A is put in place, the nut C pushing the washer B before it is turned up against the inner shoulder of the shank A, the knob which has a square aperture to fit on the spindle is next pushed on and the shank A is screwed upon the part D drawing the knob to its place and covering up the washer B and nut C. This forms a neat and secure fastening, it is impossible for the knob to pull off, the spindle is not weakened by drilling, and there are no disfiguring screws through the face of the knob as in other so-called screwless fastenings. Wood knobs with this fastening are furnished by the manufacturer at a slight advance in cost over those with the ordinary fastening.

It will not be out of place to mention here how popular the use of wooden door-knobs for interior doors has become. The undersigned, who was the originator of this class of goods, started their manufacture seven years ago and has built up quite a large business. He has not been without imitators, but by maintaining the quality of his goods and reducing prices as circumstances justified it he has been enabled to keep in front of his competitors.

J. BARDSLEY,
59 ELM STREET,
NEW YORK CITY.

THE Whittier Machine Company are putting into the building on the corner of Kneeland and Washington Streets, owned by the Hill estate, one new passenger and two new freight elevators all to be operated by their hydraulic hoisting machinery upon their Pressure-Tank system.

They are also about to put into the Continental Bank Building, Boston, a passenger-elevator operated by one of their double-screw, high-speed steam hoisting-machines.

WELLS RUSTLESS IRON.

THE Wells Rustless Iron Company, 21 Cliff street, New York, had for some time previous to this year been manufacturing protected ironware under the Bower-Barff patents. A year or more ago, however, they began experimenting with a new process, the invention of Mr. W. T. Wells, the president of the company, and since the first of the year they have been using the Wells process exclusively. Iron protected by magnetic oxide has become

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such a popular article in many lines of trade that a description of this new process will be of interest to our readers. The charge of iron or steel articles to the amount of some 12,000 pounds weight is placed in an ordinary muffle or heating-chamber and there gradually heated during a period of some twelve hours. It is important not to heat any part of the charge so as to blister it, and yet every part must be raised to the dull-red heat required by the process. The inventor prefers to use the gas made by the well-known Siemens Producer in heating the charge and to admit air in limited quantities into the chamber along with the gas coming from the producers, just enough to consume the latter and give a small flame in the chamber. During this operation the dampers are opened, permitting the escape of the products of combustion into the chimney. The heating must be gradual so that the charge will be raised in temperature evenly and equally and all blistering avoided. The increase of temperature should be so regulated that the maximum of heat is reached at the end of about twelve hours, though if a smaller charge than the one mentioned is used a shorter period will suffice. The surface of the charge by this gradual heating is apt to become somewhat oxidized both to red and black oxide, but the effect is irregular and patchy where it does appear at all, and is not of any general importance in the result. The next and final step in the process is to turn on a mixture of steam and carbonic oxide gas when the chimney damper is closed. In this atmosphere of steam and carbonic oxide the charge is left for some five hours, more or less. The heat of the charge at the beginning of the operation is a dull-red and air should be excluded as far as possible. The steam need be under little or no pressure, and may or may not be super-heated before introducing into the chamber. This final step of the process is the essential one, in which is produced the desired result of black or magnetic oxide. The furnace employed, is an ordinary muffle or heating-chamber of the usual construction. It does not require any special appliances to make it absolutely air or steam tight, or capable of standing high pressure, as the Wells process does not require elaborate or costly apparatus. The magnetic oxide produced by this process is described as very hard and comparatively elastic. It stands frictional wear well, but is apt to be injured by hammer blows or rough usage. Wherever the coating is removed rust will form, but it will not burrow under and raise the adjacent coating. The works of the Wells Rustless Iron Company are situated at Little Ferry, N. J., but a short distance from Jersey City, where there are furnaces for treating all kinds of iron and steel. The process is especially adapted to wrought-iron pipe for water conveyance, grate frames and fenders, architectural iron-work, ship-work, gas, culinary utensils, cast-iron soil-pipes and plumbers' castings, etc.

THE WELLS RUSTLESS IRON CO.
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ELEVATORS.

We take great pleasure in calling the attention of our friends and customers to our sample elevators, a freight and passenger, placed in the immense Park Building of the Centennial Exposition, Cincinnati.

Our passenger elevator is operated on the Hinkle pressure-tank system, the Laidlaw & Dunn Company, of Cincinnati, furnishing the necessary pump and tank.

The freight-elevator is run from the city water-main, and is fitted with our patent variable device, whereby a great saving of water is accomplished.

We thus show two styles of our elevators, both of which represent a class of workmanship, which places them foremost among modern hoisting-machines for safety, speed and durability.

We extend a cordial invitation to all to call and personally examine the elevators, and to ask any information they desire of the attendant, who will be pleased to supply it, and to extend any courtesy in his power.

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WROUGHT IRON FENCE.

The annexed cut illustrates a recent improvement in the construction of wrought-iron fence, invented by us. The special feature of this fence consists of the U-shaped bottom rail, a sectional view of which is shown in the illustration. The pickets pass through both flanges of the rail, and are securely fastened between them, (method patented), so as not to be removed, forming an absolutely rigid panel and one that will never sag. We are manufacturing all styles and sizes of this fence, having recently shipped two car-loads, and are now filling a large order for the City of Natchez, Mississippi, besides various orders for all parts of the country. Any one requiring wrought-iron fence would do well to secure our catalogue and prices, as our fence is better and cheaper than other styles in the market. We are also manufacturers and contractors of building iron work of every description, and make a specialty of wire work, brass work, etc.

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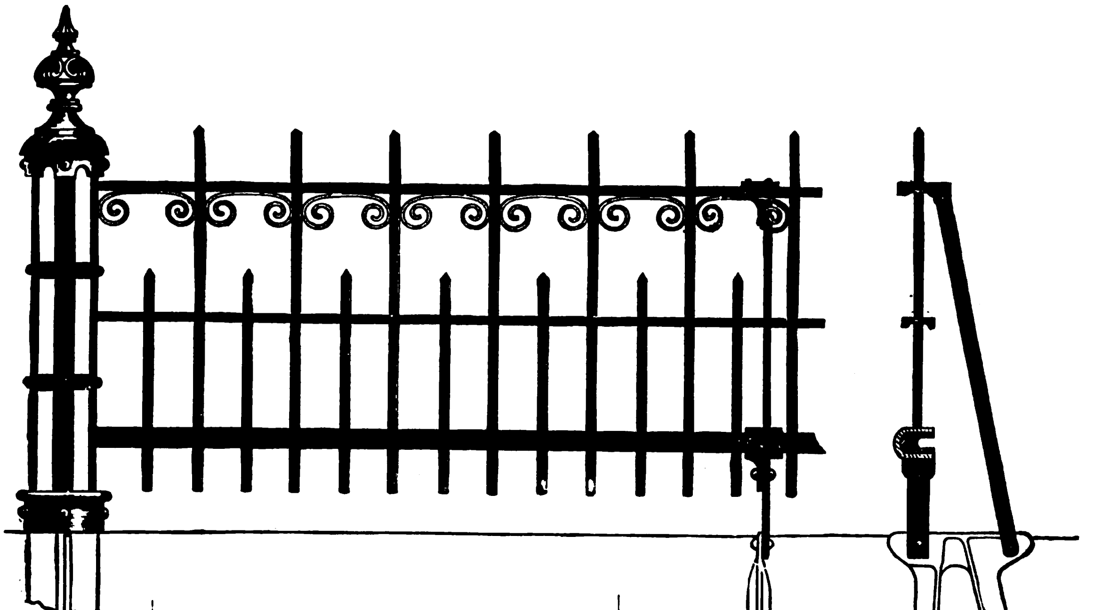

NOTES

The sales of Babcock & Wilcox boilers for July and August, 1888, are as follows: Maginnis Cotton Mills, New Orleans, La., third order, 720 horse-power; Pierce, Butler & Pierce M'f'g Co., Syracuse, N. Y., 208 horse-power; J. Arce & Co., City of Mexico, Mexico, second order, 61 horse-power; Morel & Verbeke, Gaud, Belgium, 163 horse-power; Corporation of Glasgow, Glasgow, Scotland, 220 horse-power; Rew & Co., Plymouth, England, 10 horse-power; East River Gas Light Co., Ravenswood, L. I., second order, 51 horse-power; Kaukana Paper Co., Kaukana, Wis., 250 horse-power; Van Nortwick Paper Co., Batavia, Ill., 125 horse-power; Dowson Economic Gas & Power Co., London, England, 114 horse-power; Glenfield Co., Ltd., Kilmarnock, Scotland, second order, 188 horse-power; Bartholomæ & Leicht Brewing Co., Chicago, Ills., second order, 244 horse-power; Hampton Normal & Agricultural Inst., Hampton, Va., 120 horse-power; A. & F. Parkes & Co., Birmingham, England, 140 horse-power; Player Bros., Birmingham, England, 230 horse-power; Societe Française de Materdel Agricola, Vierzon, France, 63 horse-power; Vanderbilt University, Nashville, Tenn., second order, 82 horse-power; Worcester Polytechnic Institute, Worcester, Mass., 51 horse-power; Gordon's Mills Paper Co., Aberdeen, Scotland, 280 horse-power; Impresa Concesionaria de Agnas Subterraneous del Llobregat, Barcelona, Spain, 61 horse-power; Millward, Bradbury & Co., Liverpool, England, sixth order, 61 horse-power; G. W. Gail & Ax., Baltimore, Md., 244 horse-power; London Elec. Supply Corp'n, Ltd., London, England, 3000 horse-power; The City of Keokuk, Iowa, 90 horse-power; Alfonso Flaquer, Barcelona, for new Electric Station, Valencia, 416 horse-power; E. Atkins & Co., Boston, Mass., for Cuba, third order, 156 horse-power; The Shelby Iron Co., Shelby, Ala., 292 horse-power; Ing'o Cieneguita, Abreus, Cuba, 146 horse-power; Western Electric Co., Chicago, Ills., 208 horse-power Western Electric Co., for N. Y. City, second order, 448 horse-power; Leon Pequin, Vendee France, 40 horse-power; City of Sandwich, Illinois, 61 horse-power; Louis Fontaine, La Madeleine lez Lille, France, 673 horse-power; Grand Ave. Railway Co., Kansas City, Mo., second order, 200 horse-power; Gordon & Maxwell Co., Hamilton, Ohio, second order, 146 horse-power; Takata & Co., London, England, second order, 83 horse-power; Irlbacher & Davis, Buffalo, N. Y., 246 horse-power;

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W. E. & J. Rigdon, Kent, England, 75 horse-power; The W. B. Oglesby Paper Co., Middletown, Ohio, 146 horse-power; Plenas Escubos Hermanos, Barcelona, Spain, 121 horse-power; Alex. B. Barry, Moscow, Russia, 40 horse-power; Chicago Sugar Refining Co., Chicago, Ill., third order, 272 horse-power; Black & Clawson, Hamilton, Ohio, 95 horse-power; C., B. & Q. R. R., Ottumwa, Iowa, second order, 60 horse-power; Societa Generale Italiana de Elettricita Sistoma Edison, Milan, ninth order, 105 horse-power; A. Flaquer, Barcelona, for new Electric Station, Valencia, second order, 208 horse-power; Anglo-American Brush Elec. Lt. Co., Ltd., London, England, fourth order, 30 horse-power; Consolidated Electric Light Co., N. Y. City, 500 horse-power; Walker Brothers, London, England, eighth order, 20 horse-power; Ing'o Portugalete, Cienfuego's, Cuba, 450 horse-power; N. Y. Life Insurance Building, St. Paul, Minn., 312 horse-power; N. Y. Life Ins. Building, Montreal, Canada, 225 horse-power; St. Paul Railway Co., St. Paul, Minn., 624 horse-power. Making the total sales for two months 13,162 horse-power.

A UNIQUE example of glass work is now on exhibition at the rooms of the Tiffany Glass Company, 333–5 Fourth Ave., New York. It is a window made for a residence in San Francisco, consisting of three long openings, the centre of which is occupied by a full length figure of a maiden clothed in delicate pink; over her head is carelessly thrown a thin vail which hangs in easy folds and is caught at the ends so as to carry the apple blossoms which she has gathered. The coloring is decidedly Whistler-like. The pose of the figure is extremely graceful. The side openings are filled with rather conventionalized floral patterns in faint pink and light yellows. The title given on the window is "Spring." The Tiffany Glass Company consider it a great success in the handling of delicate tones.

During the past week a glass window has been on exhibition during the evenings, at the Fifth Avenue Art Galleries. The subject is "The Talking Well." It is from a painting by Vely in the Corcoran Gallery at Washington. The coloring is rich and the distance and perspective well managed. The second window is also executed by the Tiffany Glass Company.

THE works of the Ball Engine Company, Erie, Pa., manufacturers of High Speed Automatic Cut-Off Engines are being crowded to their utmost capacity with orders for their engines. Among their recent shipments are the following:

Denver, Col., Elec. Illuminating Co., two 80 horse-power engines; Seeger Guernsey Co., St. Augustine, Mex., one 25 horse-power engine; City of Greenville, S. C., one 100 horse power engine; Thomson-Houston International Elec. Co., Australia, one 60 horse-power engine; Atlantic, N. J., Elec. Lt. Co., one 200 horse-power engine; Olean, N. Y., Elec. Lt. Co., one 60 horse-power engine; Paterson, N. J., Elec. Lt. Co., three 100 horse-power engines; Paterson, N. J., Elec. Lt. Co., one 80 horse-power engine; Lynn, Mass., Gas Light Co., one 100 horse-power engine; Electric Improvement Co., Santa Clara, Cal., one 80 horse-power engine; Akron, O., Elec. Street R. R. Co., two 200 horse-power engines; Pensacola, Fla., Elec. Lt. Co., one 100 horse-power engine; Danville, Pa., Elec. Lt. Co., one 80 horse-power engine; Brattleboro, Vt., Gas Light Co., one 80 horse-power engine; Walla Walla, W. T., Elec. Lt. Co., one 35 horse-power engine; Thomson-Houston International Elec. Co., Hioga, Japan, one 25 horse-power engine; Ada, O., Electric Light Co., one 80 horse-power engine; Blaisdell & Pride, Jacksonville, Fla., one 40 horse-power engine; W. W. Cumner, Cadillac, Mich., one 100 horse-power engine; Paul Kuhnke, Clyde, O., one 25 horse-power engine; City Gas Light Co., Norfolk, Va., one 80 horse-power engine.

THE Whittier Machine Company have recently constructed for the West End Street Railway Company, corner of Dunmore and Roxbury Streets, Roxbury, a freight elevator for their stables. Also for the Hotel Gladstone, corner of Broadway and 59th street, New York, an hydraulic elevator operated by their pressure tank system, and for Miss Lowell's building, No. 2 Beacon street, Boston, an hydraulic elevator for passenger service.

THE celebrated "Gorton" House-heating Boilers, manufactured by the Gorton & Lidgerwood Manufacturing Company, New York, are meeting with much favor abroad. The company lately shipped two No. 1 Boilers to Joannes Couvert, Havre, France.

MR. I. P. FRINK,

551 Pearl Street, New York City.

Dear Sir,—The magnificent reflecting chandelier, made from special designs, furnished by you and placed in the West Harlem M. E. Church, corner 129th Street and 7th Ave., New York City, is simply grand. So neat, chaste, and graceful in design that it commands the attention and elicits favorable comments from every one who views it. It lights our main audience room abundantly with as pleasant a light as it seems possible to produce; we rarely use it to its full power. To say that we are delighted with the fixture would hardly express our satisfaction.

Some of the members of our Building-Committee are largely connected with the building interest in this city, and they each endorse the appropriateness of the fixture.

Respectfully, BARTLETT SMITH,

C. FRASER.

SOUTHWARK FOUNDRY AND MACHINE COMPANY,

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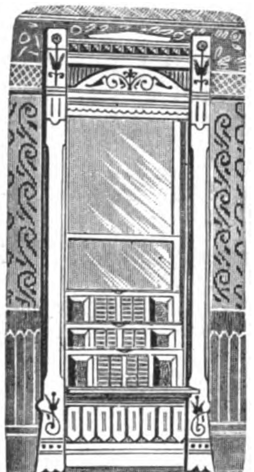

Hartman's Patent Inside Sliding Blind.

A great improvement over all other blinds, slide up and down in the window like sash, move easily, and stay where placed. No hinges, hence no swinging, sagging and tangling with curtains and window drapery. Must be *seen* to be appreciated. Excel *any other sliding blind* in the market for *economy, durability, style, beauty, convenience, etc.* Also the most perfect arrangement for Fly Screens, consisting of an additional section which slides same as the blinds; very much admired by all.

They are also made to slide entirely down to the floor, into pocket, out of sight, without any additional expense. 25 per cent. cheaper than the hinged blind, and *will last double the length of time.*

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The only blind that is furnished with an *Automatic Burglar-Proof Lock, free of charge.*

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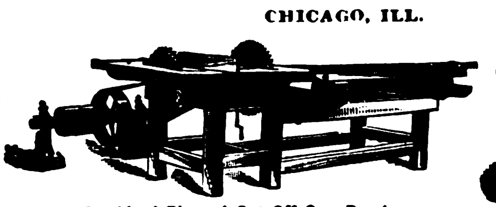
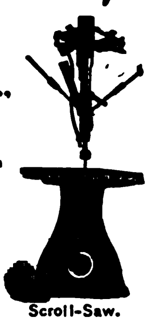
63 & 65 South Canal St., CHICAGO, ILL.

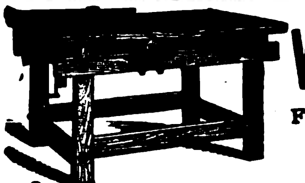
24-inch Finishing Planer.



Combined Rip and Cut-Off Saw-Bench.



Scroll-Saw.



Saw-Bench.

Wood-Working Machinery,

FOR PLANING-MILLS, SASH, DOOR and BLIND FACTORIES, CABINET and CARRIAGE MAKERS.

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PORTLAND CEMENT

Is superior to any other Portland Cement made. It is very finely ground, always uniform and reliable, and of such extraordinary strength that it will permit the addition of 25 per cent more sand, etc., than other well-known brands, and produce the most durable work. It is therefore the most economical to use. 8,000 barrels have been used in the foundations of the Statue of Liberty. Architects and those interested in Portland Cement will please send for my pamphlet, which will be mailed free on application. It contains valuable directions for the employment of Portland Cement, a table of results of the strength of the Dyckerhoff Cement when mixed with sand and broken stone in various proportions, together with tests and testimonials of eminent Engineers, Architects and Consumers.

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SOLE AGENT FOR THE UNITED STATES.

PRESERVATIVE COATINGS.

FOR EXTERIOR USE.

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FLOOR FINISH.

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HANDLES

MANUFACTURED BY

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Write for Illustrated Catalogue.

Something New for the Stable.

Read's Patent Harness Bracket.

An Article long wanted but never before made. Holds the whole harness, takes no more room than the ordinary hook or peg, can be used for both single and double harness. Gives the harness-case a neat appearance, as it carries the harness up uniformly in width with the saddle, beside keeping the bridle and breastplate in their proper shape. They are neatly japanned, with gilt facings. Price $18 per dozen. Are now in use in over 100 first-class private stables in and about Boston.

Each bracket lettered **"J. J. Read, Boston, Mass."** For sale by dealers everywhere.

Indorsed and approved by the following named gentlemen, all of whom have them in use:

Boston: R. H. White, J. Montgomery Sears, J. T. Morse, Jr., Thos. Motley. South Boston: Benjamin Dean. Cambridge: F. A. Kennedy, John Bartlett, Chas. H. Gass. Portsmouth, N. H.: Hon. Frank Jones. Milton: Col. H. S. Russell, J. Malcolm Forbes. Dedham: A. W. Nickerson. Baltimore, Md: J. D. Mallory. Newton: J. C. Potter, C. E. Billings, A. R. Mitchell. Waltham: J. H. Ellison. Readville: C. G. White. Beverly: Dr. Chas. Haddock. Swampscott; C. P. Curtis. Boston, Mass.: Waldo Adams, with the Adams Express Co. Philadelphia, Pa.: Edward N. Williams, of the Baldwin Locomotive Works.

The public are cautioned against all similar brackets not marked with my stamp, as such brackets are infringements of patents held by me.

Also cedar-top riding-saddle bracket. Price $3.50 each. And whip-rack for English coach and straight whip combined. Price 50 cents each.

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Flat, Concrete Fireproof Construction,

AS ADOPTED IN HUNDREDS OF

Works, Mills, Factories, Banks, Flats, Public Buildings, etc.

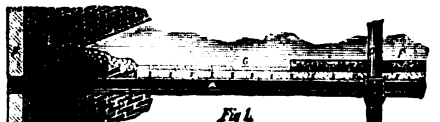


Fig 1.

A is the main girder resting on wall E and on pillar D. B are the small iron joists resting on main girder A and on wall at other end. C the iron joists B bedded in concrete and forming both floor and flat ceiling. F shows a portion of the floor C laid with patent solid and noiseless Wood Block Tiles.

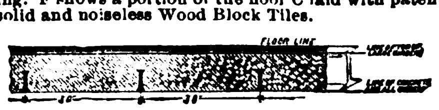
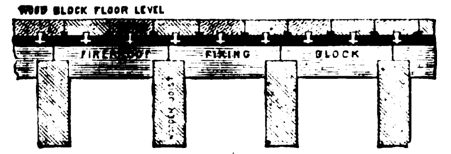


Fig. 2.

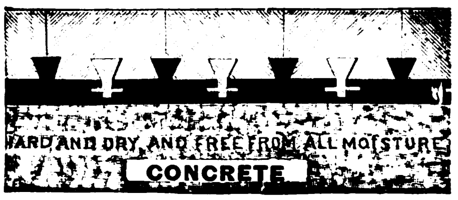
Section showing Flat Fireproof Construction where iron joists rest on bottom flange of main girder and in which all ironwork is entirely protected from fire.



System of Making a Fireproof, Immovable, Solid and Noiseless Floor over Wooden Beams.

without the aid of Deafening, Pugging. Beam linings, Mineral Wool, filling in of wet Concrete between the beams and like methods of an unsanitary and destructive nature usually adopted.

This forms a perfectly level and well bonded floor, strong and durable in all its parts. Indispensable to all who are and have been troubled and put to great expense by leaky floors. Perfectly Watertight. NO boarded floor required to be laid over Wooden Beams, FIREPROOF FIXING BLOCKS being used instead.



The best, cheapest, and most approved flooring possible for public and private buildings of every description. Wood blocks are dovetailed on under sides and ends to each other; and the underlying cement—after it has become quite hard and dry and free from all moisture, by means of a specially made antiseptic composition which forms a complete damp-course—prevents dry and wet rots and makes a thoroughly dry and warm floor. Forms one solid, compact mass, quite noiseless. No space underneath for rats, vermin, or dust to harbor. Air and water tight. Laid in various designs and in all kinds of woods. Very durable and lasting.

Over 5,000,000 feet laid in places where parquet tiles and marble are often laid, advantages being its NOISELESSNESS, SOLIDITY and WARMTH.

NIGHTINGALE FLOOR IMPROVEMENT CO.
151 Broadway, - - NEW YORK.

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THE AMERICAN ARCHITECT AND BUILDING NEWS

ADVERTISERS' TRADE SUPPLEMENT.

No. 77. SATURDAY, NOVEMBER 3, 1888. VOLUME XXIV. No. 671.

THE HAYES FIREPROOF METALLIC LATHING, ETC.

THE Hayes system of Lathing is composed of Sheets of Iron or other metal, 40 inches by 96 inches (or less), over the surface of which at near intervals are openings five-sixteenths by thr e-fourths of an inch, produced by a process of puncturing; the flanges around the openings are pressed forward and curled outward, forming lips and hooks which clinch or hold the mortar to the surface of the sheets, while at the base of each opening is formed a matrix into which the mortar is pressed, and by which perfect dovetailed clinches or bonds are obtained; the process imparts to the sheets an undulated surface, giving it additional strength. The plaster is spread over the surface of the sheets, embedding the lips and hooks and filling the matrix, thereby permitting a degree of coalescence which insures most perfect and substantial work. There is an entire freedom from expansion, contraction, or other organic action, which would be liable to injure the bond. The coating can only be removed by picking it off in particles.

Less mortar may be used than upon any other fireproof lathing and it may be applied stiffer than ordinary.

Scratch coating is entirely dispensed with, as is also hair.

For one coat work this lathing affords a most effectual foundation.

These lathing sheets can be readily bent so as to adapt themselves to any feature in architecture, such as pilasters, columns, niches, groins, cornices, wainscotings, bases, casings, angles, trimmings, etc. Large coves are formed without brackets, supports or furring, and entail no cost beyond the plain surface.

Country residences may be lathed on the exterior and the beautiful effects of cut stone designs may be made in Portland Cement, such is the tenacity of this lathing that all fears as to the falling away of the plastering will, upon inspection be instantly removed.

FIREPROOF PARTITIONS.

This system of lathing permits of the construction of strong partitions of from $1\frac{1}{2}$ inches thick, finished with double-plastered faces, made by forming in the lathing sheets, which by virtue of the peculiar punctures are already rigid, a series of ribs such as are made for furring, and which are secured to each other back to back as shown in Figures 6 and 7 and when necessary for an increase in strength they may be re-inforced with a framework of band or bar iron or with angle or T iron, as shown in Figures 8 to 11, the lathing being secured to the frame with suitable clamps, the plastering on both sides aiding in binding the whole together so that very substantial walls are afforded.

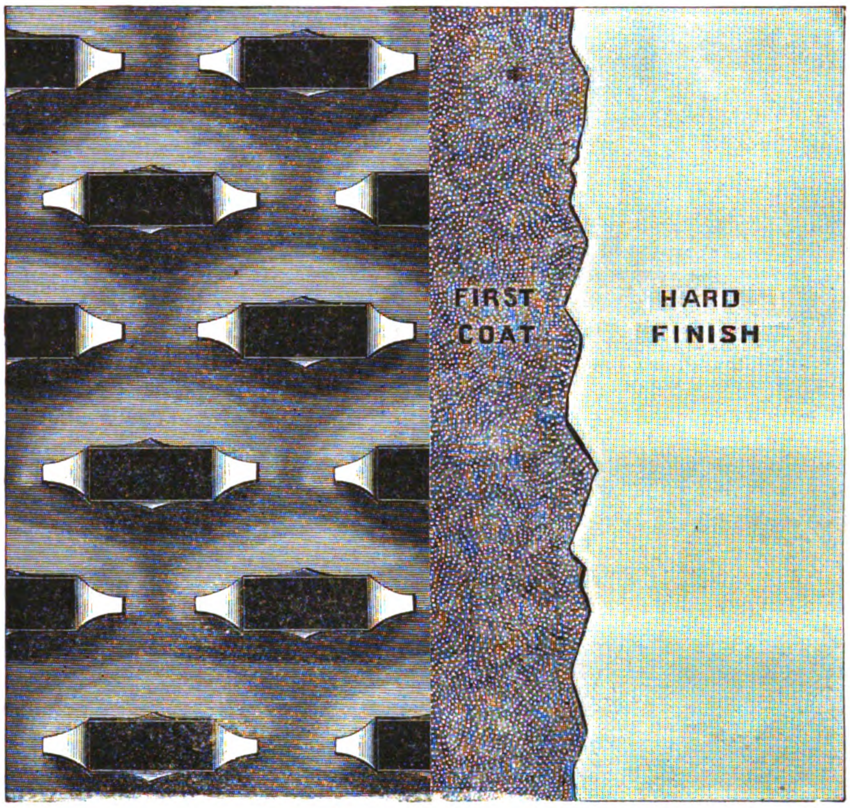

Fig. 1. Elevation of Lathing, having a portion of its face covered with "one coat" and a portion with "hard finish," as second coat, with Figures 2 and 3, sections of same.

Fig. 2.

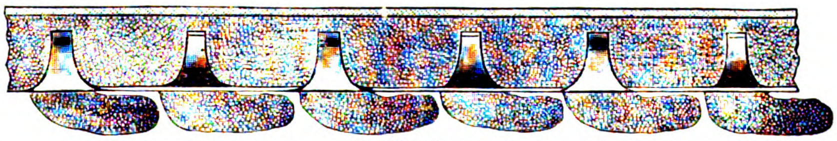

Fig. 3.

These partitions or walls may be adopted with great advantage especially in elevator shafts, stairways, hallways, offices, bed-rooms, closets, on about the stages of theatres, boxes, etc., affording the greatest protection against fire and great economy in room. Fireproof flues for hot air may be formed in like manner, avoiding the necessity of restricting them to the brick walls.

A fireproof floor may be made by nailing the lathing sheets over the boarded surface, and then with a proper mixture of gravel, sand and cement, or other suitable material, a permanent and effective fireproof floor will be produced, which may be arranged in variegated colors or ornamental design, or may be laid in t'les or tessellated pavements, or it may also be readily applied to old plastering in like manner as suggested to the floors, occupying but three-eighths of an inch in thickness.

For bath-rooms, wash-rooms, laundries, etc., by covering the floors as before described, and by turning up the lathing on the walls, a perfect cemented troughed floor may be made.

It will be economy, even should this lathing cause an increase in the first cost of any building, to adopt it in lieu of the old time wooden lathing; the increase, if any, would be but trifling, as less time is consumed in applying it. One coat of mortar is dispensed with; furring for cornices and other

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projections are made in the lathing sheets, and entails no cost further than the plain surface: it takes up less floor space and is substantially fire and vermin proof. Any saving would be false economy in consideration of the great advantages gained.

Portable slabs or plates, composed of the lathing sheets of suitable sizes, plastered (plain or molded) as panels, stiles, wainscotings, trimmings, etç., tubes for columns, pilasters, etc., may be prepared in the workshop and set up in their final position. These may be re-inforced with bar, angle or T iron similarly arranged to those described for partitions.[1]

Very fine work has been done on this lathing with King's Windsor Cement, and Adamant Plaster, and it is specially adapted for all kinds of plastic material, the clinching hooks taking the place of fibrous bonds with a most beneficial result.

The sections above referred to and especially the method of framing for doorway shown in Figure 12, may be varied, and other methods of construction found to be more appropriate.

This lathing is furnished in iron plain, dipped in a lime coating made fast, dipped in asphaltum or galvanized, but as lime is a well-known preservative of iron, the alkali therein completely neutralizing and preventing corrosion, the plain iron or the lime coating is all that is necessary.

The merchantable sizes of the sheets will be 30 x 96 inches.

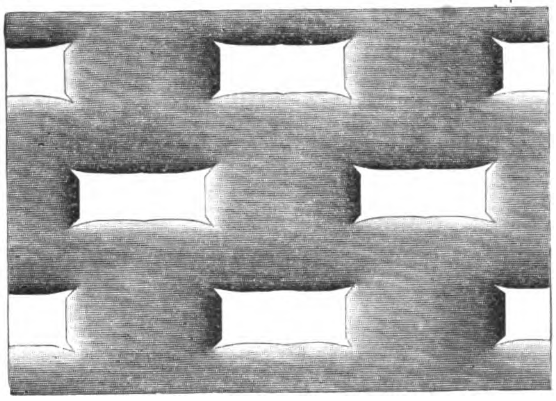


Fig. 4. Back Elevation of Lathing.

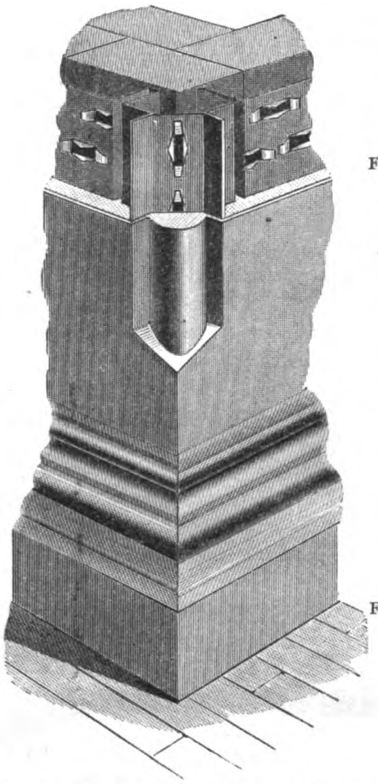


Fig. 5. Perspective showing external angle of brick wall with lathing, furring, screeding, stopped off angle bead, and cement base.

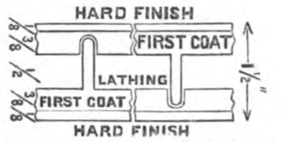


Fig. 6. Section of double-faced, two-coat plastered partition, 1½ inches thick.

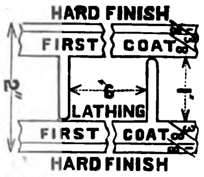
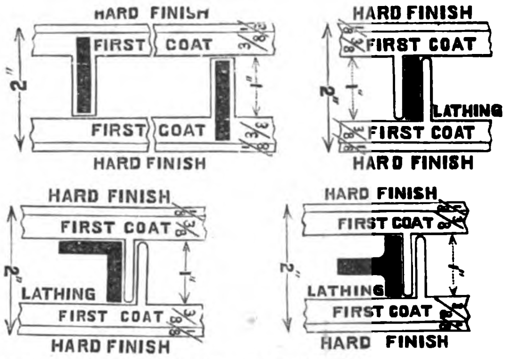


Fig. 7. Section of same, 2 inches thick.



Figures 8, 9, 10 and 11. Sections of double-faced, two-coat plastered partitions, 2 inches thick, reinforced with bar, angle and T iron frame work.

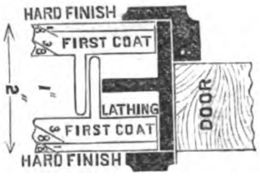


Fig. 12. Section showing a method of framing a doorway to a 2-inch double-faced, two-coat plastered partition.

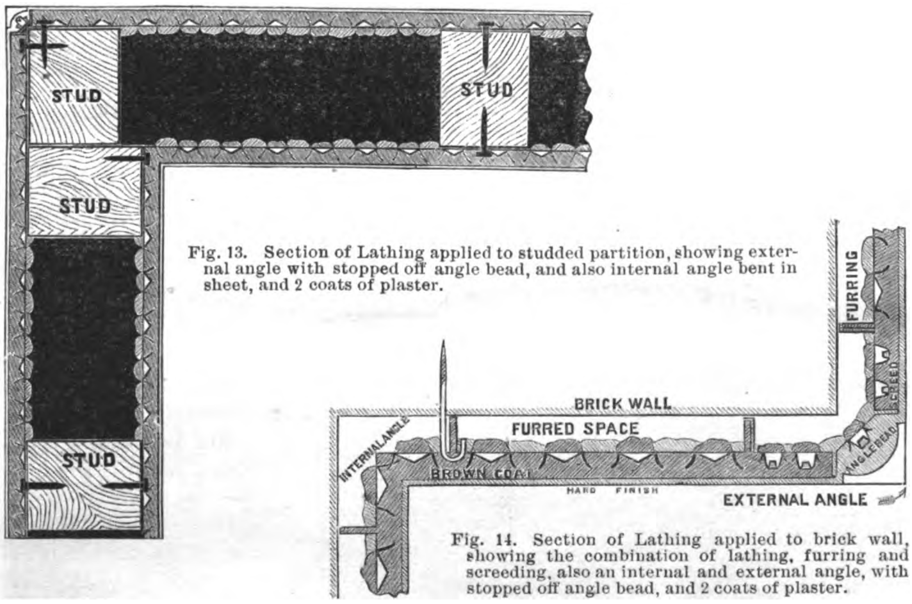


Fig. 13. Section of Lathing applied to studded partition, showing external angle with stopped off angle bead, and also internal angle bent in sheet, and 2 coats of plaster.

Fig. 14. Section of Lathing applied to brick wall, showing the combination of lathing, furring and screeding, also an internal and external angle, with stopped off angle bead, and 2 coats of plaster.

[1] The thickness of the plastering coat shown in the drawings and in models which have been prepared is no criterion as it may be made thinner if required.

Any person of ordinary mechanical skill can readily apply the lathing, the angles can readily be formed in the sheets by any machine which is used in forming angles in ordinary sheets of iron.

When the lathing is nailed upon woodwork it is secured with steel barbed wire nails one inch long, or the ordinary slating nail will do, taking care to nail in a vertical line down the centre of the beam in such manner as will allow them to shrink without confliction; where the sheets overlap each other the same rule should apply. For interior angles the sheets are bent so as to avoid any cracking of the plaster at that point.

When the lathing is applied to a brick wall, ribs are formed which perform the function of furring, through the grooves of which ordinary cut-nails may be used, driven into the joints of the brickwork. Cross furring or supports to ceilings, when the beams are of iron, is composed of bar or angle iron firmly clamped, and to which the lathing sheets are secured by stout wire holdfasts of special form.

This lathing has been subjected to the criticisms of many experienced architects and plasterers in New York and it has successfully withstood severe tests as to its fireproof and sustaining properties. It is already receiving a hearty welcome from the trade.

It has been patented in Great Britain, Canada, France, Belgium, Austria, Germany, and Italy and will shortly be introduced in those countries. At present it is being manufactured by the inventor, the undersigned, who also intends to grant shop rights in every town and city in the United States, furnishing his machinery for its production.

George Hayes,
71 8th Ave., New York.

The Whittier Machine Company have just completed for the Acushnet Mill Corporation of New Bedford, Mass., a large upright steam boiler. This is the fourth boiler of this style constructed for them.

SANITAS PLUMBING APPLIANCES.

William Paul Gerhard, C. E., the well-known expert and popular writer and authority on sanitary engineering, writes of the Sanitas bath-tub in his article on "Domestic Sanitary Appliances," in *Good Housekeeping* for 1884-85: "Here the stand-pipe is placed in a recess, but so as to be perfectly accessible for cleaning. The outlet of the Sanitas tub is made unusually large, to effect a quick discharge, thus securing a thorough scouring to the trap and waste-pipe, the tub acting as a flush-tank. It is by far the best sanitary tub of which I have knowledge, and answers all requirements of a perfect plumbing fixture."

Speaking of water-closets, he writes: "Another form of improved hopper-closet calls for a detailed description, as it is of a superior construction, its design based upon sound sanitary principles. This is the Sanitas self-sealing water-closet, manufactured by the Sanitas Manufacturing Company of Boston.

"The closet is manufactured in white earthenware, and resembles somewhat in shape the short hopper, having only a bowl and a trap combined in one piece, and no superfluous interior surfaces, angles, or corners to which soil may adhere. The area of the bottom of the bowl has been so shaped as to present a large surface of standing water

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to receive and deodorize waste matters, and the overflow point is raised much higher than usual, in order to retain a deep body of water, and hence a deep water-seal in the bowl. It should be noted that the water is deepest at the rear of the closet, at the point where soil would be most liable to strike the sides.

"The top of the bowl is provided with a flushing rim, into which the flushing water enters in a novel manner. To avoid the usual noisy operation of the flush, and also the frequent spattering, the flushing water is conducted into a large body of water below the normal water level, as shown, from where it overflows into the flushing rim, and thence down the sides of the bowl. A part of the flushing water is directed, independently of the stream which feeds the flushing rim, to the bottom of the bowl, where it enters through a jet or nozzle arrangement, discharging with great force into the ascending leg of the closet trap. This removes part of the water from the trap, and causes that which is in the bowl to sink into its neck, where it is more easily acted upon by the upper flush. Meanwhile the upper jet fills the passage leading to the flushing rim, and, overflowing, descends upon and drives out the waste matters which have descended into the neck. The lower jet is always covered by water from the upper flush, the construction and proportions being such as to ensure this result. Hence both jets are noiseless.

"In ordinary trap-jet closets no provision is made to ensure the covering of the jets, and a load roar is occasioned. These closets, moreover, are emptied by siphonic action produced intentionally in the trap, and this emptying by siphonage adds to the jet roar a disagreeable 'gulping' sound, caused by the sudden inrush of air into the dip as the water escapes. Both of these causes of noise are avoided by the flushing principle of the Sanitas closet.

"The action of the Sanitas closet is almost instantaneous, it being possible to flush it easily in one second, and with less than a gallon and a half of water.

"Another peculiar feature of the flushing of this closet is the Sanitas water-closet supply-pipe, in which all delay and noise occasioned by the water passing from the cistern down the service-pipe, when the pull is operated and the cistern valve is lifted, is avoided by constructing the supply-pipe on the principle of an inverted bottle, so that the water shall be hung in it below the cistern valve as far down as the standing water in the bowl, simply by the pressure of the atmosphere. This supply-pipe is, therefore, always full of water, the pipe being closed at the top by a cistern valve, and at the bottom sealed by the water in the closet-bowl. The flush is thus made to act instantaneously. The closet is self-sealing, for the moment the water in the trap is lowered to a certain point just above the dip of the trap, water follows from the upright supply-pipe until the trap is refilled up to the overflow line. There is thus provision made for re-establishing a perfect deep water-seal if the latter should be lost by evaporation, or even by siphonage. The latter case will but rarely occur, as the trap has more than the ordinary depth of seal. Evaporation, on the contrary, is constantly going on in houses closed during the summer months, and it is here where the advantage of the self-sealing closet and the Sanitas water-closet supply become most apparent. Finally, as every part of the closet-bowl and trap is readily accessible, and at al times open to inspection, it is easy to remove, by a sponge or otherwise, all water from the closet in houses to be left unoccupied during the winter, in which plumbing work is most exposed to freezing."

Of the pantry-sink he says: "A very convenient arrangement is what is known as the Sanitas pantry-sink, in which the stand-pipe is provided with a simple lever movement to lift it from its seat, if it is desired to empty the sink. The volume of water discharged from such a sink through a very large outlet, and concentrated beyond this in a trap and waste-pipe of small calibre, causes a thorough flushing of both, and prevents the grease from adhering to the sides of the pipe."

Speaking of basins, he says in the same publication: "Much the best form of basins of which I have knowledge is the stand-pipe outlet basin, or Sanitas wash-basin, manufactured in Boston by the Sanitas Manufacturing Company; and since this fixture will, in my judgment, soon supersede all former devices, and since it has so many superior features of simplicity, convenience, and sanitary construction, I shall describe it fully." Then follows a detailed description of the fixture, saying among other things: "It is of the utmost simplicity and of great convenience in use, while its appearance is, if anything, even more pleasing than that of the usual form of bowl."

SANITAS MANUFACTURING CO.,
207 TREMONT STREET, BOSTON, MASS.

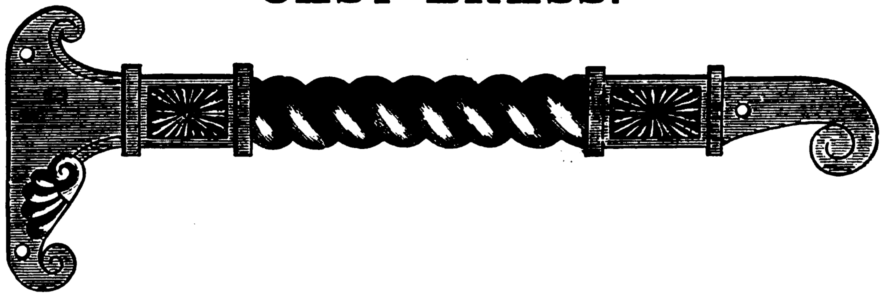
THE Whittier Machine Company have recently put in for Messrs. P. & F. Corbin, New Britain, Conn., a freight elevator.

NOTES.

THE sales of Babcock & Wilcox boilers for September, 1888, are as follows: Somerset Fibre Co., Fairfield, Me., 120 horse-power; Latrobe Steel Co., Latrobe, Pa., 832 horse-power; Edinburgh Roperie & Sail Cloth Co., Ltd., Leith, Scotland, 156 horse-power; La Espana Industrial, Barcelona, Spain, 168 horse-power; La Espana Industrial, Barcelona, Spain, second order, 480 horse-power; Oliver & Roberts Wire Co., Ltd., Pittsburgh, Pa., fourth order, 416 horse-power; Electric Light & Power Co., Melbourne, Australia, 1500 horse-power; Kansas City Electric Light & Power Co., Kansas City, Mo., second order, 1339 horse-power; Louis Franke & Co., for F. S. Dale, Whitehall, N. Y., second order, 75 horse-power; Providence Steam & Gas Pipe Co., Providence, R. I., 71 horse-power; Farmer & Brandon, London, England, 20 horse-power; Moet & Chandom, Epernay, France, 240 horse-power; F. de la Royere-Masureil, Brussels, Belgium, 46 horse-power; Alexander B. Bary, Moscow, Russia, 40 horse-power; Alexander B. Bary, Moscow, Russia, 120 horse-power; Alexander B. Bary, Moscow, Russia, 30 horse-power; Alexander B. Bary, Moscow, Russia, 20 horse-power; Societa Amoniana Raffineria de Zuccheri, Ancona, Italy, second order, 372 horse-power; Excelsior Electric Co., for S. Wechsler & Co., Brooklyn, 50 horse-power; Jackson & Sharp Co., Wilmington, Delaware, fourth order, 208 horse-power; Jackson & Sharp Co., Wilmington, Delaware, fifth order, 51 horse-power; Gubruder Sulzer, Winterhur, Germany, 140 horse-power; Louis Fontaine, La Madeleine lez Lille, France, 175 horse-power; C. B. Cortrell & Sons, Westerly, R. I., second order, 104 horse-power; Cortland Wagon Co., Cort.

Antique Hinge Plates

CAST BRASS.



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J. B. SHANNON & SONS,

1020 Market Street, PHILADELPHIA.

WRITE FOR ILLUSTRATED CATALOGUE.

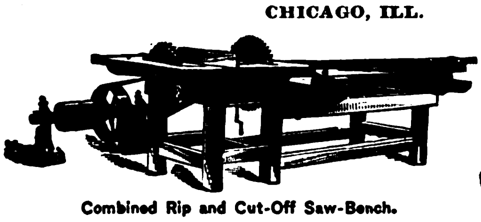
GOODELL & WATERS,

3201 Chestnut Street, PHILADELPHIA.

29 Spear Street, SAN FRANCISCO, CAL.

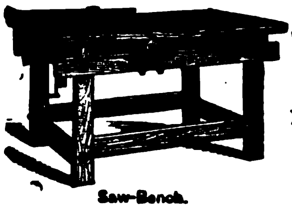
63 & 65 South Canal St., CHICAGO, ILL.

24-inch Finishing Planer.



Combined Rip and Cut-Off Saw-Bench.

Scroll-Saw.



Saw-Bench.

Wood-Working Machinery,

FOR PLANING-MILLS, SASH, DOOR and BLIND FACTORIES, CABINET and CARRIAGE MAKERS.

Send for Catalogue.

land, N. Y., second order, 104 horse-power; Spreckels Sugar Refining Co., Philadelphia, Pa., 7500 horse-power; Impresa Concesionaria de Aguas Subterraneous del Liobregat, second order, 61 horse-power; Alexander Smith & Sons Carpet Co., Yonkers, N. Y., sixth order, 184 horse-power; Sociodad Mahiteuse de Electricidad, Madrid, Spain, 186 horse-power; New York Life Insurance Co., Omaha Building, third order, 488 horse-power; New York Life Insurance Co., Kansas City Building, fourth order, 488 horse-power; Solvay Process Co., Syracuse, N. Y., eighth order, 416 horse-power. Making the total sales for September, 16,200 horse-power.

Soft Steel Plate is taking the place of iron for bridge, ship, tank and structural work generally. We have decided to make prices for Sheared and Universal Rolled Plate, of the grades above mentioned, as low as are quoted for iron plates for similar purposes. If in the market, write or telegraph for prices. No delays in filling orders.

At the Homestead Works we have recently completed a Slabbing Mill. This universal, reversing mill is designed, especially for rolling large steel ignots into slabs.

We are prepared to supply steel slabs, of all grades, either of Bessemer or Open-Hearth quality, of widths ranging from 18″ to 48″, of thicknesses varying from 4″ to 24″, and of any specified length.

If you are requiring steel slabs we shall be glad to quote prices.

Orders can be filled promptly.

Capacity, four hundred tons daily.

CARNEGIE, PHIPPS & CO., LIMITED.
Pittsburgh, Pa.

The Gorton & Lidgerwood Company, 96 Liberty Street, New York City, have lately received an order for four large boilers to be used in heating a large building 60 by 200 feet, and three stories in height, in the Brooklyn Navy Yard. When these boilers are set, there will be six of the Gorton boilers in use in the Navy Yard, one of which has been in use three winters, giving entire satisfaction during that time, as the following taken from a letter dated May 2d, 1888, to the Gorton & Lidgewood Co., from Chief Civil Engineer, P. C. Asserson, will show.

"In reply to your inquiry, I would state that the No. 5 Steam Generator furnished and put up by Mr. Gorton in this Navy Yard, in 1885, has given good satisfaction, and has been in continual use the past three winters for heating an isolated building of 75,000 cubic feet of space. It is economical in the use of fuel — less than one-half the amount of coal being needed than was previously used to supply the horizontal tubular boiler used for this purpose. It requires very little attention, as the automatic arrangements both for fuel and water feed work well. We have recently put up a No. 4 Gorton Boiler in a large building in this yard, as we prefer this Boiler to any other method of heating by steam."

The four new boilers will be fitted up with a new base having a standing lever shaking attachment to the grate.

Mr. I. P. Frink, of 551 Pearl Street, New York, whose reflectors and reflecting chandeliers are so generally introduced in public buildings, reports many orders on hand; among prominent contracts for lighting, he has underway: the Tompkins Avenue Congregational Church, Brooklyn, N. Y.; Summer Avenue Congregational Church, Brooklyn, N. Y.; First Presbyterian Church, Galveston, Texas; Asbury Memorial Methodist Episcopal Church, Providence, R. I.; Cumberland Presbyterian Church, Murfreesboro, Tenn.; Reformed Church, Athens, N. Y.; Opera House, Carbondale, Pa.; Los Angeles Theatre, Los Angeles, Cal.; the Art Galleries of Messrs. Boussod, Valadon & Co., 303 Fifth Avenue, New York; Galerie des Beaux Arts, 174 Fifth Avenue, New York; G. W. Lininger, Omaha, Neb.; the American Art Galleries, New York, for the Verestchagin Exhibition; and several orders from foreign countries.

The Whittier Machine Company have recently constructed for the Whittier Cotton Mills of Lowell, Mass., two horizontal steel boilers, each five feet in diameter.

THE CENTURY.

SOME FEATURES IN 1889 — THE NOVEMBER NUMBER BEGINS A VOLUME — A NEW ART ENTERPRISE — KENNAN'S SUCCESSFUL SERIES.

"The growth of The Century Magazine, although in one sense phenomenal, is but the natural result of a quick appreciation of what the reading public demands, and of a studied effort to gather together the very best that writers, artists and engravers can supply." It has always been the desire of the conductors of The Century that it should be

The One Indispensable Periodical

of its class; that whatever other publication might be desirable in the family circle, The Century could not be neglected by those who wish to keep abreast of the times in all matters pertaining to culture. Its unprecendented circulation would seem to be the response of the public to this desire and intention of the conductors of the magazine; and this popularity again lays upon the magazine the burden of ever-increasing excellence. The 37th volume, nineteenth year, begins with the November number, now ready, and the following is a list of some of the more important features of the year, most of which begin in this number:

The Century Gallery of Italian Masters,

Engraved by Timothy Cole, who is recognized as the leading magazine engraver of the world, and who has already spent four years in the European galleries, reproducing upon wood for The Century this series of the most valuable pictures in the Old World. This is the most important artistic work upon which the magazine has ever entered, and in order that the fullest educational results may be derived from the pictures, they will be published in historical order, with brief critical papers by W. J. Stillman and Mr. Cole. The first of these, with engravings and notes on the Byzantines and Cimabue, is in November.

Strange True Stories of Louisiana,

Collected by George W. Cable, author of "Old Creole Days," "The Grandissimes," etc., the first one of which, and a chapter entitled "How I Got Them" appears in November. Some of these stories are merely transcribed or translated by Mr. Cable from the original manuscripts; others are accurate narratives by him of actual occurrences.

The Siberian Exile System.

The remarkable series of papers which Mr. George Kennan is now furnishing to The Century upon this important subject is attracting the attention of the civilized world, and the papers are being reprinted in hundreds of foreign journals in Europe and Asia, but are not allowed to enter Russia in any language. The San Francisco *Chronicle* says that, in these papers, "Mr. Kennan has lifted the veil and revealed a condition of affairs of which the outside world had no conception or realization." The November Century contains a strong paper in this series on "Political Exiles and Common Convicts at Tomsk," with interesting illustrations.

Lincoln in the War.

The authorized "Life of Lincoln," by his private secretaries, Messrs. Nicolay and Hay, now appearing in The Century, is holding the attention of thousands of readers. In the forthcoming chapters the authors will develop more fully the relations of the President with McClellan, Grant and other leading generals of the war, with the members of the cabinet and other prominent men. Lincoln's plan for the gradual abolishment of slavery will be fully explained.

The Romance of Dollard.

A serial novelette by a writer new to readers of The Century, Mrs. Mary Hartwell Catherwood, begins in the November number, with a preface by Francis Parkman, the historian. It is a story of devotion and heroism, based upon events in the early history of Canada. The author, as Mr. Parkman says, "is a pioneer in what may be called a new departure in American fiction." Illustrated by Henry Sandham.

Bible Scenes Illustrated.

Occasional illustrated papers by Mr. Edward L. Wilson, on Bible subjects treated in the International Sunday-School Lessons, will appear from time to time during the year, and there will be articles on existing monuments connected with the Old and New Testament narrative, by various writers. A paper by the Rev. Charles S. Robinson, D. D., on "Where was 'the Place called Calvary'?" with striking illustrations, appears in this November number, and there is also a timely essay on "The New Reformation," by the Rev. Lyman Abbott, D. D.

Pictures of the Far West.

A series of full-page engravings from original drawings by Mary Hallock Foote may be expected in each number of The Century for the coming year. These designs are the artistic result of a long residence in the far West, and are characteristic of the landscape and costumes of a large part of the country. The first picture, "Looking for Camp," is in November.

The November Century

Contains, besides the serial features already mentioned, an article on "The Guilds of the City of London," illustrated by Joseph Pennell; Unpublished Letters of Lord Nelson, with two portraits of the hero of Trafalgar; a short story, "Mistaken Premises"; "Gravelotte Witnessed and Revisited," by Murat Halstead, illustrated; Editorials, Open Letters, Poems (by James Whitcomb Riley), H. S. Edwards, Joaquin Miller and others), etc., etc.

Other serial features to be begun later include Charles DeKay's illustrated papers on Ireland,— the ethnology, customs, landscape, etc.; a series of humorous and pathetic Irish-American stories by George H. Jessop; articles by the distinguished artist, John La Farge, on Japan, with engravings from original studies; supplemental War Papers, untechnical and of general interest; among them "The West Point of the Confederacy," "Recollections of Stonewall Jackson," "Lyrics of the War," "Beecher at Liverpool," and "The Western Soldier"; more of Dr. Buckley's papers on Spiritualism and Clairvoyancy; further illustrated papers on English Cathedrals (with a chapter on Westminster Abbey); short stories by leading writers, novelettes (to be announced later), essays, etc., etc.

Terms. A Special Offer.

The regular price of The Century is $4.00 a year. In order that new readers who begin with November, 1888, may get all of Mr. Kennan's Siberian papers, we make a special offer of *a year's subscription from November, 1888, and the twelve back numbers from November, 1887 (in which the Siberian papers were begun), for $6.00; or a year's subscription from November, 1888, with these twelve back numbers bound in two handsome volumes, for* $7.50. Dealers everywhere take subscriptions and supply numbers, or they will be sent, prepaid, from the office of the publishers, The Century Co., 33 East 17th Street, New York.

The Century *is indeed a great living picture of the world's interests and movements, and is a library in itself, and a liberal education to every reader.*—Boston Traveller.

He who subscribes for The Century *does himself, his friends or his family an inestimable service.*— The Methodist, Baltimore.

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The American Architect and Building News

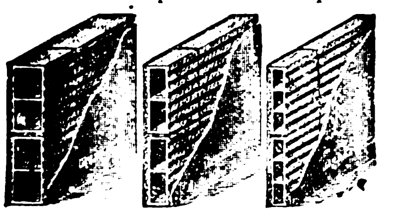
ADVERTISERS' TRADE SUPPLEMENT.

No. 78. SATURDAY, DECEMBER 1, 1888. VOLUME XXIV. No. 675.

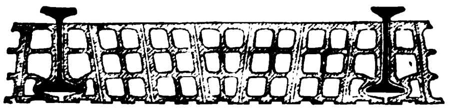
RARITAN HOLLOW & POROUS BRICK COMPANY.

THIS Company, as its name implies, makes a specialty of the manufacture of hollow-brick and porous terra-cotta for fireproof buildings.

The use of these materials for fireproof-construction has become so universal that it is scarcely necessary to describe them. The accompaning cuts show the usual forms of hollow-brick for fireproof floors and partitions.



Hollow-brick Partitions.



Flat arch between iron beams, with skew-back protecting lower flange of beams.

In addition to these, blocks or slabs of porous terra-cotta are made for wall-furring, column-covering, roof-lining, etc. The porous terra-cotta can be easily cut and fitted, and will receive and hold nails so that slate or other roofing can be nailed directly to the roof-blocks.

The Raritan Hollow & Porous Brick Company was incorporated in 1882, and at once secured a large share of the trade in this line. Since then their business has steadily increased so that it has been necessary to enlarge the plant each year, and at the present time it is, without question, the leading firm in the trade.

They make a specialty of large contracts, and have every facility for furnishing large quantities of materials at short notice.

Among the more important buildings for which they are now furnishing the fireproofing materials, are: United States Trust Company's Building, New York City; Bank of America Building, New York City; United States Army Building, New York City; American Museum of Natural History Building, New York; Fidelity Title & Deposit Company's Building, Newark, N. J.; Girard Life Insurance & Trust Company's Building, Philadelphia, Pa.; United States Court-House and Post-Office Building, Reading, Pa.; New York Life Insurance Company's Building, Montreal, Canada; Canadian Pacific Railway Station, Montreal, Canada; City-Hall, Fall River, Mass.

The Company has also lately added a department for the manufacture of buff front-bricks of various shades and fire-bricks of all grades.

Illustrated catalogues will be sent on application to

THE RARITXN HOLLOW & POROUS BRICK CO.,
115 BROADWAY, NEW YORK CITY.

THE Whittier Machine Company, have recently constructed for the Yale and Towne Manufacturing Company, Stamford, Conn., an hydraulic freight-elevator.

THE CHROME STEEL WORKS, BROOKLYN, N. Y.

THE city of Brooklyn, N. Y., though it cannot be classed with Pittsburgh and like cities, as a great centre of the steel industry of the country, is certainly entitled to a place of distinction in this particular. The steel-manufacturing interests of this city, have increased wonderfully of late years. One of the representative concerns of this character located in Brooklyn, is the Chrome Steel Works, established in 1867 on Kent Avenue, Keap and Hooper Streets, and of which Mr. S. H. Kohn is the president, and Mr. C. P. Haughian, vice-president. The foundry, rolling-mill, melting, hammer and other shops, which heretofore covered nearly two acres of ground, were enlarged in the spring of 1887, and gas was substituted for coal in the heating and melting furnaces. The new plant necessary for this change was made complete in every respect, even to the gas generator for the manufacture of the gas used, and the productive capacity of the works was increased two-fold. Another advance step was taken this year when it was found necessary to have additional "rolling" facilities, and the works were further enlarged by the addition of a wing 80 x 150 feet. The establishment now presents an imposing appearance and takes rank with any of its class in this country or abroad, and here is turned out in large quantities the well-known "Chrome Steel."

Ordinary or carbon steel is a compound of iron and carbon, the proportions of carbon being from 0.5 to 1.5. It differs from iron merely in the amount of carbon contained in it, and so we see carbon steel is more a condition of iron, than a distinct metal. To demonstrate how closely iron and steel are related, it is only necessary to mention that whereas cast-iron contains about 3.5 per cent of carbon, and malleable-iron contains 0.4 per cent, carbon steel contains about 1 per cent; thus being a sort of intermediate between cast-iron and malleable-iron. Chrome steel differs from carbon steel in the substitution of chromium for carbon in its manufacture. It is an alloy of chromium and iron, the proportions of which are accurately weighed and scrupulously exact in every grade: both metals, uniting perfectly in alloy, become integral in their unity, producing a uniform steel, which it is claimed is much superior to the carbon steel. Though it is an easy thing to claim superiority over competitors for almost any article of manufacture, it is seldom however, as easy to establish the correctness of the claim. In this case the superiority of "Chrome Steel" is readily recognized, and lies in the fact that, when properly hardened, steel made in this way *cannot be cut* by the finest saws, drills or chisels, as it is much harder than such tools are made. It is exceedingly tough when hardened, and will not deteriorate by the continued application of great heat, and unlike carbon steel may be worked in large masses, with perfect reliability — a quality of vital importance in the general use of steel. It has been favorably reported upon by the authorities at the United States Navy Yard, Washington, D. C., who after having subjected it to severe tests, say, in the course of a letter to the manufacturers, enumerating its good qualities: "It will do from three to four times more work in all the various kinds of tools than carbon steel will." Chrome steel may be made quite ductile and soft by using chromeisen instead of spiegeleisen in the Siemen's steel process, where the resultant may be tempered to several grades of hardness within well defined limits. It is capable of being welded and worked as easily as wrought-iron, while it may be made into all the various forms required for machinery without the danger of being destroyed by over-heating. Its adaptability for manufacturing purposes is apparent. The Chrome Steel Works, manufacture what is known as their Chrome tool-steel, in rounds, squares, octagons, and irregular shapes. This is very desirable for making tools and like purposes. A boring tool of Chrome steel, properly proportioned and tempered, will stand to bore and turn cast-iron or other metal that is too obdurate to yield to the persuasions of the best tempered and "highest" grade of carbon crucible steel, made from the best iron.

A large fly-wheel for a special purpose with a narrow rim, and thirty-two feet in diameter, was found to be so hard on its "face" that it could not be turned with tools of the best carbon steel. Grinding and clipping were attempted, but the surface was like glass, and resisted all efforts. Tools of Chrome steel at last compelled the iron to yield and a costly

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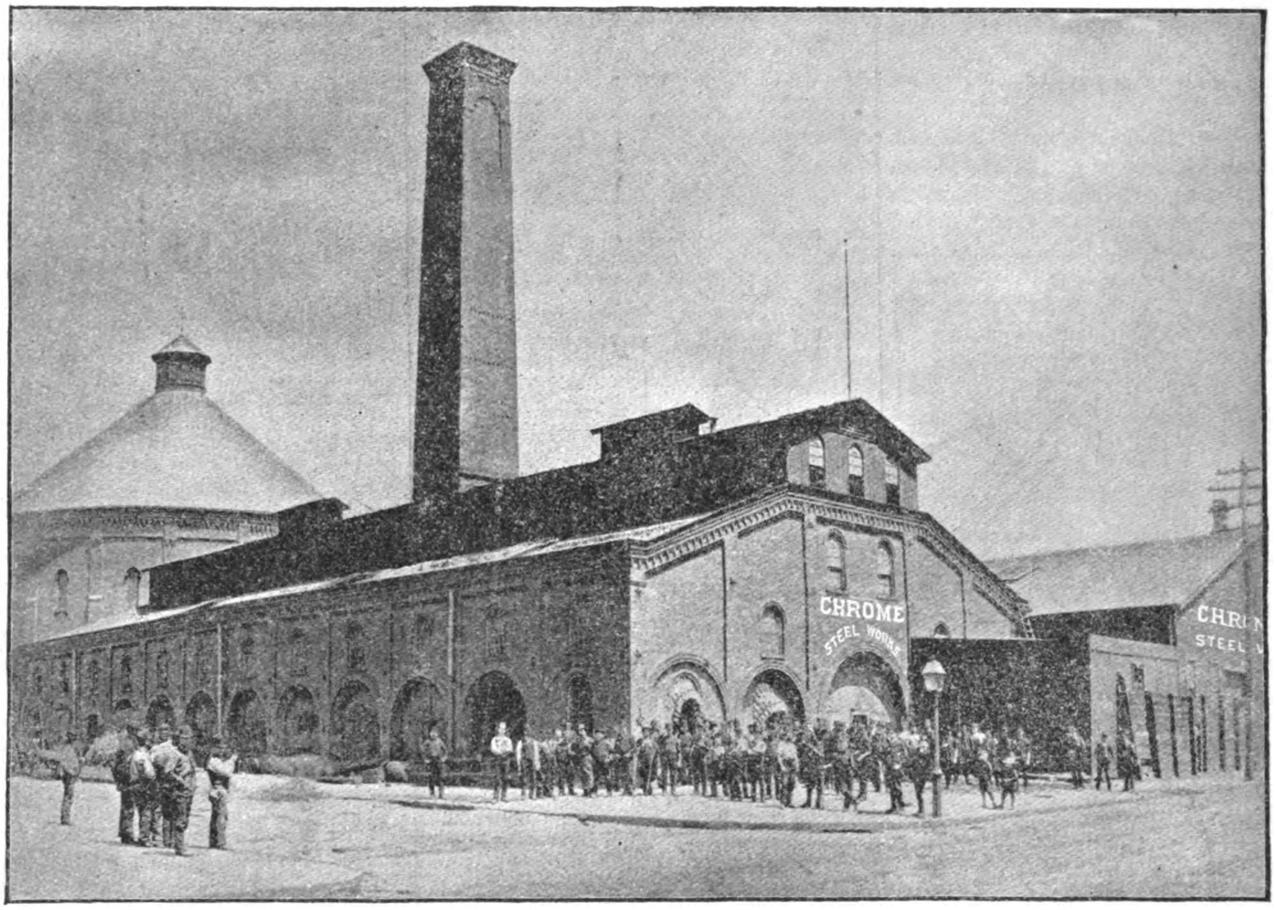
casting was thus saved. This is but one of the many instances in which the superiority of Chrome steel as a tool steel, has been most strikingly and satisfactorily demonstrated.

As this material when properly hardened will not yield to the saw, drill, hammer or chisel, it is found extremely desirable for window-guards, gratings, doors, and other constructions where absolute safety is not alone desirable, but necessary.

The manufacturers of this popular product, also make besides their regular tool-steel, what is called their five-ply combination plates, consisting of alternate layers of welded Chrome steel and iron. This material has met with much favor among architects, builders and bankers for burglar-proof vaults, and safe manufacturers have found it singularly well adapted for making burglar-proof safes. A jail or prison the cells of which are constructed of this material may be truly said to be positively jail-proof, as it is really impossible for the most expert jail-breaker to work his way through it, whatever means he may employ. We also find Chrome steel turned to good account in the manufacture of the celebrated Adamantine shoes and dies for stamp-mills, now used extensively with the most flattering results throughout the mining regions of both North and South America. It is proved in using these goods that the wear being so very slight, little if any of the metal combines with the amalgam or becomes mixed with the crushed ores, thus saving the precious metals from an admixture that, as all millmen know, is so injurious to free amalgamation. Shoes and dies made of Chrome steel will not "cup," neither will the shoe break at the shank. Both shoe and die wear even from end to end, thus crushing in a given time from fifteen to twenty per cent more ore than shoes and dies made of cast-iron, which invariably wear unevenly. The manufacturers also have evidence that they outwear three sets of those made of the best cast-iron. They also manufacture tappets, cams and bosses for stamp-mills, and crusher-plates and shell-rolls, used in the crushing of ores and rock, and also cast to pattern in all shapes such as crank-shafts, gears, pinions, stamp-dies, parts of steam-pumps and hydraulic-presses. The best and withal the most satisfactory way for our readers who are desirous of learning still more regarding these works, would be to visit them, and see for themselves the enormous quantity of steel that is produced and furnished by

THE CHROME STEEL WORKS,
Brooklyn, N. Y.



CHROME STEEL WORKS.

THE ECONOMY FOUNDRY.

On June 4th, last, the J. F. Pease Furnace Company, of Syracuse, N. Y., bought a piece of property in that city, of about 240′ x 210′ in dimensions, situated three-quarters of a mile from the Company's main works on Willow Street, and about the same distance from the centre of the city. The property is located on the corner of Belden Avenue and Sand Street, one block north of West Genesee Street, and fifty feet south of the main line of the West Shore Railroad. One week after the purchase, ground was broken for the erection of a foundry, pattern and machine shops for the Economy Foundry Company, a concern organized some time previous and composed of Frank A. Austin, draughtsman, Jno. Aldinger, machinist, William H. Brown and M. C. Reddin, foundrymen. On September 15th, a little over three months after its commencement, the plant was practically completed and the first iron was successfully melted. The buildings erected cover about one-half of the lot and were especially constructed by the Pease Company to increase its facilities and enable it to meet the constantly increasing demand for the Economy Combination Heater and Economy Warm-Air Furnaces, which the Company manufactures exclusively. The plant consists of a two-story main building of brick, with the foundry and sand-bins adjoining on the east, built of wood, a large portion of which is Georgia pine. The foundations of the buildings lie at the foot of the West Shore Railroad Embankment, so that a switch from that road runs directly to the second story of the buildings, affording excellent facilities for receiving iron and coke into the cupola-charging and coke room, and for the shipment of finished castings from the works. The switch also runs to the top of the sand-sheds, on which there are twelve chutes for distributing the sand into the bins. The switch is provided with an Improved Fairbanks Car Scale.

The foundry-room is covered by a roof made from the special design of Mr. Frank Austin, of the Economy Foundry Company, and was planned with a view of distributing the rays of light in such a manner as to thoroughly light the foundry-room in every corner. On dark and cloudy days the light is intensified with the effect of making the interior many degrees lighter than the outside. This experiment of Mr. Austin's has been a great success, and the Pease Company boasts of having the lightest as well as the best-equipped foundry in Central New York. (Annexed cut of transverse sectional plans shows angles of the roof, etc.) The windows on lower angle of the roof are pivoted in the centre of top and bottom, and when open admit same amount of light as when closed. The windows on the upper angle are alternated with ventilators.

The cupola, made from the original design of Messrs. Brown and Austin, has a total height of forty-four feet and inside diameter of sixty inches—shell of $\frac{5}{16}$ wrought-iron—height from bottom to charging-door on the second story, twelve feet. The wind-belt on the outside of the shell is connected by two side pipes of eleven inches in diameter with the main blower pipe, of eighteen inches diameter,

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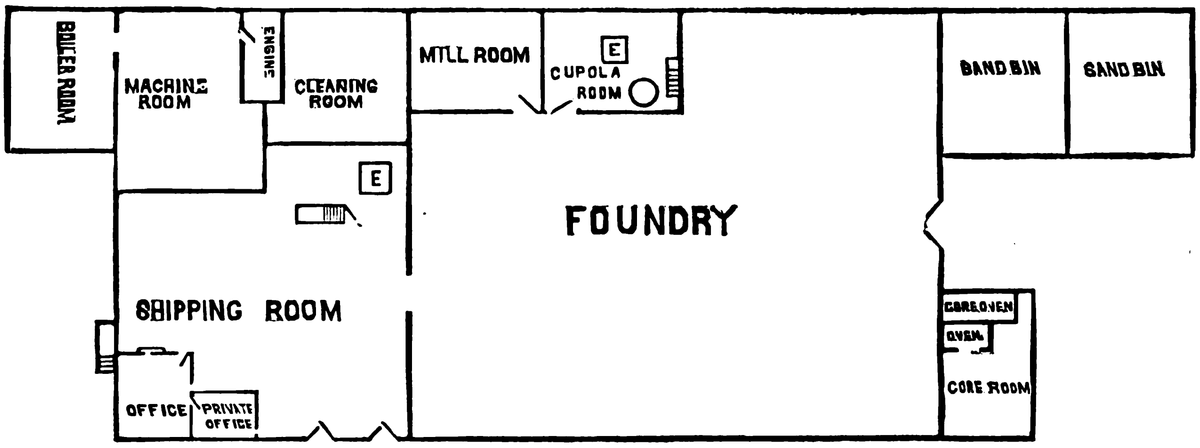
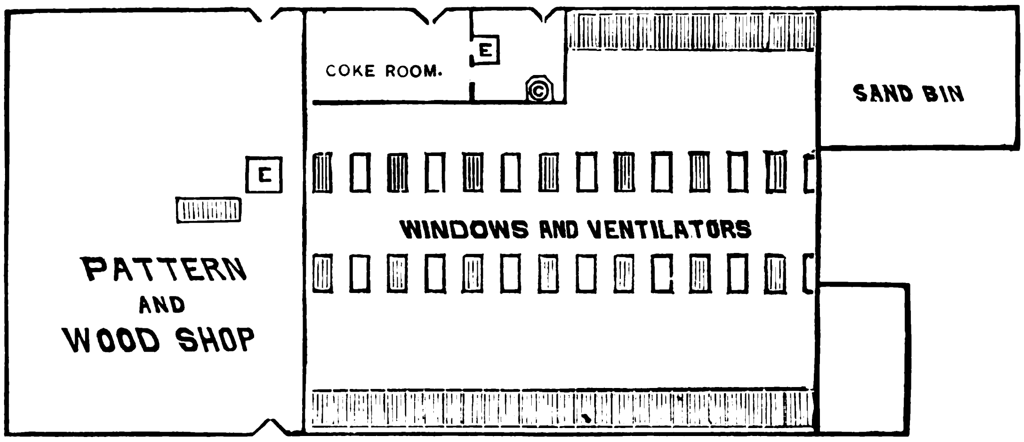
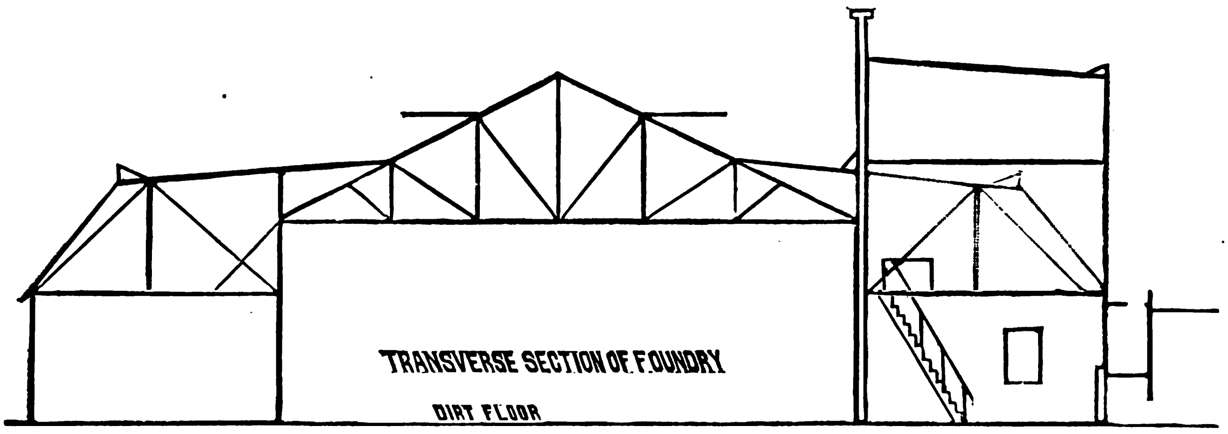
which is supplied by one No. 8 Sturtevant blower made by B. F. Sturtevant, Boston. The inside of the wind-belt is connected to the inside of the cupola by two rows of eight tuyeres each, the lower row being fourteen inches from their centre to bottom of the cupola, and the upper row sixteen inches from centre to centre of lower row. The cupola readily melts ten tons of metal per hour. The foundry-room is supplied with two large cranes of fifty-four-foot radius and twenty-seven-foot jibs, which together with the side-trams are ample to handle castings in every portion of the room. On the east side is a core-room containing two large core-ovens, one accessible by the cranes for heavy work.



FIRST FLOOR OF J. F. PEASE FURNACE CO.'S NEW FOUNDRY.



SECOND FLOOR.



As shown in the annexed plans, the general and private offices are located in the south-west corner of the first floor of the main building and well away from the noise of the machinery in the works. The large shipping-room of 60′ x 70′ is ample for its purpose, and is equipped with a Fairbanks Dormant Scale, while the south shipping-door opens onto a large wagon scale of the same make. The motive power for the plant is furnished by a sixty horse-power boiler made by the Phœnix Foundry Company, of Syracuse, and a fifty horse-power engine made by the Straight Line Engine Company of the same city. The boiler is provided with a Herrick Pump Governor and fed by a Stuart Pump, made by the Stuart Heater Company of Buffalo, and the water is heated by a Berryman Heater, made by Davis & Son, Hartford. The machine-shop is equipped with an eighteen-inch drill, and a thirty-six-inch back-geered drill, made by Prentiss Bros., of Worcester, two lathes made by Forsyth Machine Company and E. Remington & Sons, and a No. 6 diamond emery wheel.

The wood and pattern shops, 100′ x 70′, which occupy the whole of the second floor of the main building, are provided with a thirty-four-inch Clements band-saw, a twenty-inch Clements buzz-planer, a sixteen-inch Clements swing-saw, a Mosely planer, a twenty-four Clements pattern lathe with twenty-two-foot bed, an eighteen-inch Prentice drill, a No. 2 rip-saw, made by Wetherby, Rugg & Richardson, and a standard diamond emery grinder. In the mill-room are used two each twelve, sixteen, twenty and forty inch mills, and in the cleaning-room No. 7 diamond grinders with two $2\frac{1}{2}''$ x 20″ wheels.

The whole building is heated throughout by exhaust steam from a plant furnished by E. P. Bates & Co., of that city, which heats 2,700 surface feet of radiation. The entire plant, excepting the foundry-room is protected from fire by Automatic Fire Extinguishers made and erected by the Providence Steam & Gas-Pipe Company and connected to a tank of 5,000 gallons capacity situated on top of the foundry roof. The extinguishers are also supplied from four-inch city mains.

The shaftings, hangers and couplings were furnished by L. S. Graves & Son, of Rochester, and have been so arranged that 112 feet of main-line shafting on the first floor drives all the machinery on the two floors of the building. The water for the boiler is supplied from a cistern of 1,000 hogsheads capacity, situated under the machine-shop. The buildings are to be lighted by electric light from a plant in the works. Two elevators made by E. W. Houser of that city, are used in the building.

The Economy Foundry Company will make all of the castings for the Economy Furnaces and Heaters, and will also make a specialty of contract-work for all kinds of gray-iron castings, draughting, designing, pattern-work, machine-work, etc.

J. F. PEASE FURNACE COMPANY,
SYRACUSE, N. Y.

THE Whittier Machine Company have recently put into the New England Hospital for Women and Children on Dimock Street, Roxbury, an hydraulic passenger-elevator.

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"STUART" DOOR AND WINDOW SCREEN.

As we review our business of manufacturing the Stuart Window and Door Screen for the two years past, the comprehension of its enormity not only impresses us, but we are amazed by the unique, if not marvellous phases that the facts present; and as one peculiarity generally suggests others, we pursued them with some interest, though to a somewhat extreme length, and we doubt not a short narration, presenting them as they occurred to us, will interest your readers.

Manufacturing the Stuart Window and Door Screen was commenced by us in 1886, though our business of that year was scarce more than a beginning, our sales were small compared to later developments, but they very soon increased in volume, necessitating an almost immediate revolution in our modes of manufacturing, demanding at once new machinery of the most improved pattern, many times doubling the number of workmen at first employed, requiring new and larger buildings, crowding us to adopt new and quicker methods, so, that at the end of the second season we found, instead of one article simply added to our line, we had actually added an industry complete in itself, the volume of which may be clearly comprehended by a perusal of the following deductions obtained from our books showing all sales to October 1, 1888.

The sales of the screen-frames (as of every article in our line) are recorded in books, specially gotten up for the purpose, and they will show sales of each day during the year, they being posted daily, so the accuracy of the following facts are vouched for by us. The number sold to date mentioned, of the "Stuart Window-screen" is 386,220 sets, which would supply 64,370 dwellings, allowing six screens to each; and of the "Stuart Doors," the number sold is 75,768, which would provide screen-doors for 37,884 dwellings, allowing two doors each.

In lineal feet the moulding used for windows amounts to 12,081,840 feet, and of the doors the moulding measures 3,077,088 lineal feet,—in miles the total is something more than 2,871, and being laid end to end would reach from New York City to San Francisco, or from Victoria, B. C., to the City of Mexico.

We have made, for use on the same, of the Stuart Door and Window corners 214,889 pounds, or 107 tons of castings, which taken together with the frames make a total weight of 2,771,129 pounds, or 1,385 tons, to move which would require 138 freight cars of ten tons capacity, that amount being an average carload on account of the bulky nature of the goods.

The windows are packed in cases containing three dozen each — size 44″ x 18″ x 18″, requiring 10,728 cases. The doors are packed in cases of one dozen each — size 96″ x 9″ x 15″, requiring 6,314 cases for the doors, making together 135,861 cubic feet, from which a column twenty-five feet square and over 200 feet high could be made — all of finished frames ready for shipment.

Indications point to a vigorous increase in business the coming season, and our present space being inadequate, we are taking steps to provide for it, and have in course of construction large and commodious warehouses especially arranged for this branch of our industry.

E. C. STEARNS & CO.,
SYRACUSE, N. Y.

RIEFLER'S DRAWING INSTRUMENTS.

It is a well-known fact that in order to produce satisfactory results the mechanic must have good tools. For the draughtsman it is of the utmost importance, in making detailed plans to have strictly accurate and reliable drawing instruments, as poor tools will cause an endless amount of annoyance as also expense. We have secured the United States Agency for Riefler's celebrated drawing instruments, which, although comparatively new in this country, have already gained the highest reputation for excellence in workmanship and advantages in form and construction. Every architect, mechanical draughtsman, engineer and others should examine these goods and be convinced of the superiority over the ordinary style of mathematical instruments.

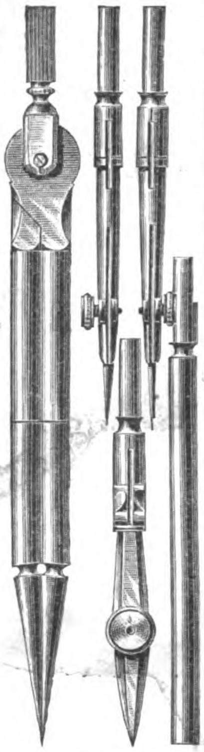

Fig. 2.

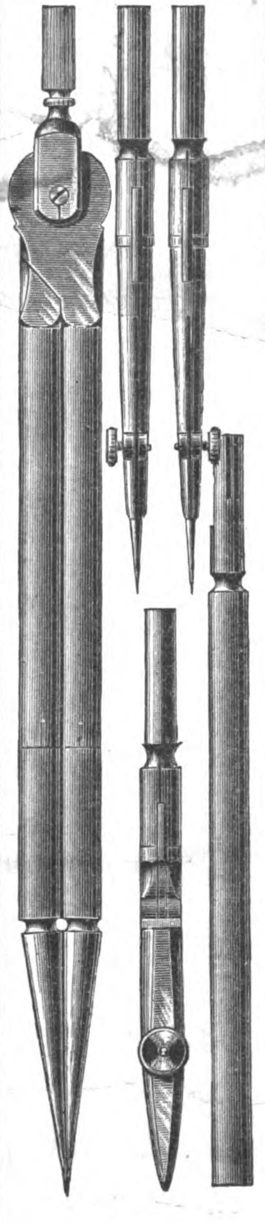

Fig. 1.

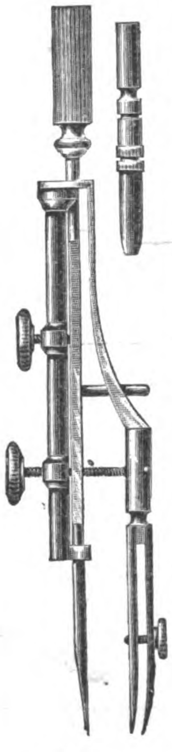

Fig. 3.

Figures 1 and 2 show the construction as applied to a drawing compass. The legs of the instrument are cylindrical thus increasing the strength, while the amount of material and space occupied is not greater. The points are cone-shaped and screwed into the eyes with the utmost accuracy, and can therefore be replaced when necessary, at a small cost. The needlepoints are of very hard steel of same size as an artist's lead, which can be substituted at pleasure since they are of equal diameter.

A very important improvement over the ordinary drawing instruments is the formation of the joints. A portion of the cylindrical leg is reduced in diameter and split to effect a tight joint with a wedge provided to prevent turning. This is made to fit a corresponding socket of same diameter, thus forming a uniform surface on outside with joint scarcely noticeable. The manner of construction is so perfect that the parts cannot easily wear out, and the projecting screws together with the annoyance of losing same, are avoided. The shifting of legs of instruments while in use is avoided by the means of screw clamps. The illustrations represent the exact size of instruments both of which will produce equally fine small work.

The Bow-compass (Figure 3) is very desirable for describing minute circles and can be adjusted to suit the requirements of the draughtsman.

Of the other instruments we might also mention the *Dotting-Pen* which is of same remarkably fine finish. These are furnished with either three or six wheels of standard designs. The Ruling-Pens are of finest possible workmanship and each carefully examined before leaving the factory.

All persons requiring reliable and accurate instruments, should examine these goods as they are second to none in quality, while their construction offers decided advantages.

Weed's T-square Holder, for which Messrs. F. Weber & Co. are also agents, is an ingenious contrivance and of great value to every person using a T-square. The slipping of square is thereby avoided, while it enables the draughtsman to hold board at an angle.

Illustrated price lists will cheerfully be sent to any address, by

F. WEBER & CO.
PHILADELPHIA, Pa.

NOTES.

It is not generally known that the Chalmers-Spence Company, N. Y., well-known manufacturers of Asbestos goods, have lately put upon the market a new patent removable covering styled their Class "C" Covering. It is formed of pure Asbestos fibre, in cylindrical sections, three feet in length of the exact size of the pipe to be covered, and is made by a special and improved process of manufacture. It is destined to become very popular with steam users.

The Chrome Steel Works, Brooklyn, N. Y., are kept busy filling orders for their well-known Chrome Steel manufactures. Their five-ply combination plates, consisting of alternate layers of welded iron and Chrome Steel, are used largely in the construction of safes, banks, safe deposit vaults and cells of jails. This material is absolutely fire and burglar proof.

The Whittier Machine Company have recently put into the Mt. Kineo House, Me., a new steam hoisting machine for their elevator, and have recently constructed for the Dover Water Works, Dover, N. H., two horizontal steel boilers, each five feet in diameter.

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